MONTANA AIR MONITORING

NETWORK REVIEW

2003

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2003 MONTANA AIR MONITORING NETWORK REVIEW

1.0 INTRODUCTION

The U.S. Environmental Protection Agency (EPA) requires the Montana Department of Environmental Quality (DEQ or Department) to conduct an annual review of the State's ambient air monitoring network.

EPA's requirements for an annual network review are in 40 CFR 58.20(d). The requirements maintain that the State must conduct an annual review to determine if the air quality surveillance system or ambient monitoring network (network) meets the monitoring objectives in 40 CFR Part 58, Appendix D. Also, the annual review is to identify needed modifications of the network, such as the termination or relocation of unnecessary stations or the establishment of new stations, which are necessary.

The Department is also required by 40 CFR 58.25 to develop and implement an annual schedule to modify the network to eliminate any unnecessary stations or to correct any inadequacies indicated by the results of the annual review. The Department must consult with the EPA Regional Administrator during the development of the schedule to modify the monitoring program. The final schedule and modifications are subject to the approval by the Regional Administrator. This document and subsequent revisions are intended to satisfy the annual requirements.

1.1 NETWORK REVIEW PROCESS

In order to conduct this review, the monitoring objective and the spatial scale of representativeness of each station, existing or proposed, are first examined to determine whether they represent the air quality condition of the area. Background information, such as maps, climatological summaries, emission inventories, traffic counts, and modeling results are gathered and reviewed. The opinions of the Department, the seven approved county air pollution agencies, and the EPA are solicited.

In the 1979 Network Review, the Department designated each monitoring site in the State as either a National Air Monitoring Station (NAMS), a State and Local Air Monitoring Station (SLAMS) or a Special Purpose Monitoring station (SPM). The NAMS/SLAMS network is designed to meet six basic monitoring objectives. The monitoring objectives are:

1. To determine highest concentrations expected to occur in the area covered by the network.

2. To determine representative concentrations in areas of high population density.

3. To determine the impact on ambient pollution levels of significant sources or source categories.

4. To determine general background concentration levels.

5. To determine the extent of Regional pollutant transport among populated areas; and in support of secondary standards.

6. To determine the welfare-related impacts in more rural and remote areas (such as visibility impairment and effects on vegetation).

The link between the monitoring objectives and the physical location of a particular monitoring site is the concept of spatial scales of representativeness. The spatial scale is determined by the physical dimensions of the air parcel nearest a monitoring station throughout which the actual pollutant concentrations are reasonably similar. The goal in siting stations is to match the spatial scale represented by the sample of monitored air with a spatial scale most appropriate for the monitoring objective. Spatial scales of representativeness, as specified by EPA, are described below:

Microscale - defines the concentrations in air volumes associated with area dimensions ranging from several meters up to about 100 meters.

Middle scale - defines the concentration typical of areas up to several city blocks in size with dimensions ranging from about 100 meters to 0.5 kilometers.

Neighborhood scale- defines concentrations within some extended area of the city that has relatively uniform land use with dimensions in the 0.5 to 4.0-kilometer range.

Urban scale - defines the overall, citywide conditions with dimensions on the order of 4 to 50 kilometers. This scale would usually require more than one site for definition.

Regional scale - defines a rural area of reasonable homogeneous geography and extends from tens to hundreds of kilometers.

National and Global scales -	these measurement scales represent concentrations characterizing the nation and the globe as a whole.

To site a monitoring station properly, both the monitoring objective and the spatial scale of representativeness must be determined. Appropriate siting scales for the various monitoring objectives are listed below:

Monitoring Objective	Siting Scales
Highest Concentration -	Micro, middle, neighborhood (sometimes urban)
Population -	Neighborhood, urban
Source Impact -	Micro, middle, neighborhood
General/Background -	Neighborhood, regional

1.2 CRITERA POLLUTANTS OF CONCERN

Montana is a large state (147,138 square miles) with a small population (902,195 - 2000 U.S. Census). Montana's air quality problems are generally associated with urban areas or in areas susceptible to temperature inversions. Ambient pollutants of concern in Montana include particulate, sulfur dioxide, lead, carbon monoxide, nitrogen dioxide, ozone, and air toxics. These pollutants of concern, physical characteristics and sources, industrial emissions, historical trends, nonattainment areas, and regulatory measures are discussed in order of priority in the following sections.

1.2.1 PARTICULATE

Particulate matter is the term given to the tiny particles of solid or semi-solid material suspended in the atmosphere. Particles ranging in size from less than 0.1 micrometer (μm or microns) to 50 microns are called Total Suspended Particulate (TSP). Particles larger than 50 microns tend to settle out of the air quickly and are not considered having a health "effect". Particulate matter 10 microns in aerodynamic diameter and smaller is considered inhalable and thus has the greatest health impact. This type of particulate matter is called PM_{10}. Particles 2.5 microns in diameter and smaller are thought to be the most damaging and are termed $PM_{2.5}$.

Combustion processes produce ultrafine particulate with particles having diameters smaller than 0.1 micron. This material quickly clumps or coagulates to form particles in the 0.1 to 2.5-micron diameter size range. These combustion products are the bulk of $PM_{2.5}$. Most natural particles like pollen and spores are larger than 2.5, but smaller than 10 microns in diameter. These particles, with $PM_{2.5}$ and some fine dust produced in grinding operations are captured as PM_{10}. Particulate larger than 10 microns is primarily of geological origin (dust). The finer the particulate, the slower it settles. In still air, PM_{10} particles require hours to settle. $PM_{2.5}$ material probably never settles and is only removed from the air by rain. As a result, $PM_{2.5}$ is the principal cause of visibility impairment, or "haze".

Particulate matter is Montana's major air pollution problem and receives a high priority from Department staff The major sources of particulate are reentrained road dust from passing vehicles on paved and unpaved roads, residential wood combustion (RWC), and industrial and agricultural activity In the past, the State was concerned with TSP and sought ways to control its sources. As a result of the 1977 amendments to the Federal Clean Air Act, several areas of the State were designated nonattainment of either the primary or secondary standard for TSP. The Department developed emission control plans as part of the State Implementation Plan (SIP) to bring the areas into compliance and implemented control strategies to keep them in compliance. On July 31, 1987, the EPA promulgated new ambient air quality standards for particulate matter. The new standards changed the focus from larger particles (TSP) to smaller inhalable particles (PM_{10}).

In January 1999, DEQ began a particulate monitoring program for fine particulate or $PM_{2.5}$. Twelve sites are operating in populous areas with a history of high particulate levels and seven Interagency Monitoring of Protected Visual Environments (IMPROVE) sites are providing background and transport information. The IMPROVE network was created in 1988 to monitor visibility in national parks and wilderness areas and it was considerably expanded in 1999. Data from these IMPROVE sites will be used to determine which pollutants must be reduced to deal with visibility impairment problems.

$PM_{2.5}$ speciation monitoring began at the Missoula - Boyd Park site in February 2001. Speciation is chemical analysis of the particulate fraction and provides important information about the material's toxicity and origin. This information is essential to any future control efforts. The Missoula site was selected for this very expensive and limited monitoring effort because of its similarity to most of Montana's particulate problem areas.

Since the promulgation of the PM_{10} standards several areas in Montana have been designated nonattainment including Butte, Columbia Falls, Kalispell, Libby, Missoula, Thompson Falls, and Whitefish. The nonattainment provisions of the

Clean Air Act mandate definite schedules to show attainment, and provide for sanctions and Federal oversight if the scheduled dates are not met. At this time, all of the PM_{10} nonattainment areas have federally approved control plans, or "SIPs". The PM_{10} nonattainment areas continue to require a significant commitment of resources for the SIP development process. The following sections provide further information on the designated PM_{10} nonattainment areas and associated regulatory measures implemented.

1.2.1.1 FLATHEAD COUNTY HISTORY

In Columbia Falls an exceedance of the 24-hour PM_{10} standard occurred in October 1987, and the area was designated moderate nonattainment for PM_{10} in 1990. From September 1989 until April 1990, the Department conducted a source apportionment study in Columbia Falls. The results from this study indicated that fugitive dust was the major contributor to the PM_{10} problem. A PM_{10} control plan was developed and submitted to the EPA in November 1991. The plan consisted of controls on fugitive dust emissions from roads, parking lots, construction, and demolition, as well as the Plum Creek facility. EPA approved the Columbia Falls SIP April 14, 1994.

Anticipating promulgation of new PM_{10} National Ambient Air Quality Standard (NAAQS), the Department initiated a source apportionment study in Kalispell in 1986 and 1987. The source apportionment study identified reentrained road dust as the predominant source followed by residential wood combustion. Kalispell was designated as a PM_{10} moderate nonattainment area in November 1990. A PM_{10} control plan for Kalispell was developed and submitted to EPA on June 29, 1990. The final plan (November 1991) consisted of controls on fugitive dust emissions from roads, parking lots, construction, and demolition. The State received Kalispell PM_{10} control plan approval March 19, 1996.

Whitefish was officially designated as a nonattainment area in October 1993. A source apportionment study conducted in Whitefish from January 1993 through March 1994 showed reentrained road dust as the largest source of particulate.EPA approved theWhitefish PM_{10} control plan on November 1, 2001.

1.2.1.2 LINCOLN COUNTY HISTORY

From October 1987 until December 1988, the Department conducted a chemical mass balance (CMB) source apportionment study in Libby. The results of the study showed that reentrained road dust and residential wood combustion were the principal particulate sources. Libby was designated moderate nonattainment for PM_{10} in November 1990. A PM_{10} control plan

for Libby was submitted to EPA on November 25, 1991, and upon review, the EPA requested that the Department commit to several revisions for the plan to be considered for approval. These revisions were submitted to the EPA on May 24, 1993, and the PM_{10} control plan was approved on August 30, 1994.

$PM_{2.5}$ monitoring, which began in 1999, indicates that Libby is going to have problems meeting the annual average NAAQS for fine particulate. Efforts are underway to evaluate the nature of the problem.

1.2.1.3 MISSOULA COUNTY HISTORY

In 1977, after the passage of the Clean Air Act Amendments, Missoula was designated nonattainment for the primary TSP standards based on data from this site. As part of the SIP to control TSP, the city of Missoula incorporated a systematic program of street sweeping and flushing to show attainment by 1982. Although not part of the plan, Missoula implemented several control measures directed at emissions from residential wood combustion. The control measures brought the area into compliance with the annual standard, but occasionally the 24-hour standard was exceeded.

During the fourth calendar quarter of 1986 and the first quarter of 1987, the Missoula City-County Health Department (MCCHD) conducted a PM_{10} source apportionment study. The study showed that the major sources contributing to the PM_{10} problem were reentrained road dust and residential wood combustion. Missoula was officially designated moderate nonattainment for PM_{10} in November 1990. On January 18, 1994, EPA approved Missoula's PM_{10} control plan.

1.2.1.4 SANDERS COUNTY HISTORY

In 1988, a 24-hour PM_{10} exceedance occurred in Thompson Falls requiring the State to develop a PM_{10} control plan with strategies to bring the area into compliance. The Department conducted a source apportionment study in Thompson Falls from October 1990 until April 1991. This study determined that reentrained road dust was the major contributing source of PM_{10} emissions. Minor sources were shown to be wood combustion and the WI Forest Products boilers. A control plan was developed and submitted to the Board of Environmental Review in June 1997. The control strategy involves more frequent street sweeping. EPA approved the Thompson Falls PM_{10} control plan on November 1, 2001.

1.2.1.5 SILVER BOW COUNTY HISTORY

During the winter of 1987-88, the Department conducted a source apportionment study in Butte. The study identified the source of particulate through a combination of optical microscopy, chemical analysis of collected particulate, and computer modeling.

In 1990, Butte was designated as a PM_{10} moderate nonattainment area. The Department developed the Butte PM_{10} control plan and submitted it to the EPA in November 1991. The control strategies included controls on residential wood combustion, paved and unpaved roads, and new operating permits for area mining activities. As part of the plan submitted in 1991, an emission inventory for Butte for PM_{10} was conducted that identified an additional "hot spot" for PM_{10} emissions in a residential area near the Harrison Avenue-Interstate 90 intersection. EPA approved the Butte PM_{10} control plan on March 11,1994.

1.2.2 SULFUR DIOXIDE

Sulfur dioxide (SO_2) is a colorless gas with a pungent odor. It is detectable by the human nose at concentrations of about 0.5 to 0.8 parts per million (ppm). It is highly soluble in water where it forms sulfurous acid (H_2SO_3). In the atmosphere, sulfurous acid is easily converted to sulfuric acid (H_2SO_4), the major acidic component of "acid rain." SO_2 is considered a major worldwide pollution problem. It is emitted mainly from stationary sources that burn coal or oil. Other sources of SO_2 include refineries and smelters. Significant amounts of SO_2 are also emitted from natural sources such as volcanoes, which rarely contribute to urban SO_2 problems.

Sulfur dioxide is a pollutant of concern in the State and there are four areas in Montana where SO_2 is an issue. These are Great Falls in Cascade County, East Helena in Lewis & Clark County, Colstrip in Rosebud County; and the Billings/Laurel area in Yellowstone County, all are discussed in detail in the following sections. In all cases, the source of SO_2 is industrial point sources.

1.2.2.1 CASCADE COUNTY HISTORY

In Great Falls the primary source of SO_2 is the Montana Refining Company petroleum refinery. As the result of dispersion modeling, performed in support of the Montana Refining Company operating permit application, potential exceedances of the SO_2 NAAQS were identified on high ground to the east of the Montana Refining facility. This forced substantial emission reductions before the permit could be issued. A new permit application in 1999, spurred renewed modeling and identified a "hot spot" closer and lower to the facility. The company's operating permit requires SO_2 monitoring in this maximum impact area.

1.2.2.2 LEWIS & CLARK AND JEFFERSON COUNTIES HISTORY

There has been a sulfur dioxide issue in Lewis & Clark County (and Jefferson County) for a number of years. The ASARCO Inc. (ASARCO) primary lead smelter is the only major SO_2 point source in Lewis & Clark County and is located next to the city of East Helena in the Helena Valley. In March 1978, East Helena was designated nonattainment for SO_2.

Monitoring by ASARCO in the early 1970s revealed exceedances of the SO_2 standard in the East Helena area. In 1975, the Montana SIP was revised to include SO_2 controls that provided for the attainment and maintenance of the SO_2 NAAQS. The strategy limited the emission rate for the sinter plant and called for a 75 percent reduction of SO_2 on an annual basis. As a result of the revised SIP, ASARCO installed a double contact acid plant with several modified stacks to reduce the SO_2 emissions in 1977.

Continued monitoring by ASARCO showed attainment of the SO_2 NAAQS at all sites except the Kennedy Park site (north of East Helena). Night drainage winds from the south along the Prickly Pear Creek often cause emissions to drift to the north. This was the probable cause of high concentrations at the Kennedy Park monitor.

In 1978 and again in 1980, conducted field tracer studies determined the good engineering practice (GEP) stack height for a proposed taller stack. These proposed changes were submitted as part of the East Helena SO_2 control plan. In 1982, a new blast furnace baghouse stack was built. The taller stack allowed emissions to be dispersed at a higher elevation and eliminated high concentrations near ground level.

Data from analyzers in the immediate vicinity of the smelter have shown exceedances, but no violations of the NAAQS or Montana Ambient Air Quality Standards (MAAQS). There were some "violations" of the three-hour SO_2 NAAQS in 1987 at the Highway 518 site, located about four miles from the smelter near a cement manufacturing facility. A data review did not determine any cause for the high readings and it was difficult to determine if the readings were valid. No other violations have occurred since that time.

In April 1991, EPA notified the Department that the East Helena SO_2 control plan had insufficiencies and a revised plan needed to be submitted by May 1992. An inadequate GEP stack height analysis and requirements in the Federal Clean Air Act Amendments of 1990 drove this request.

The Department worked with ASARCO to develop standard operating procedure (SOP) documents and a quality assurance (QA) plan for their SO_2

monitoring network. EPA approved the QA plan on February 23, 1993.

EPA approved the East Helena SO_2 control plan revision for the annual and 24-hour NAAQS on March 28, 1995 DEQ has received comments from ASARCO and EPA on the East Helena 3-hour SO_2 control plan. Progress has slowed on the development of this control plan since ASARCO closed down operations in April 2001. The closure brought SO_2 emissions in Lewis and Clark county down from 11,012 tons in 1999 to 14 tons in 2002. However, the Department will continue to pursue a revised control plan for approval by the Board of Environmental Review.

1.2.2.3 ROSEBUD COUNTY HISTORY

In Colstrip, the industrial sources for SO_2 are four coal-fired power plants. Montana Power Company's Colstrip (Colstrip) Units #1 and #2 were permitted in 1973 by the State. Unit #1 was commissioned in October 1975 and Unit #2 in August 1976. The units utilize wet scrubbers for SO_2 control with an efficiency of 70 percent.

In 1978, EPA issued a permit for Colstrip Units #3 and #4. EPA was the issuing agency because, at that time, the State had not been delegated as the prevention of significant deterioration (PSD) permitting authority. The issue of impact on the Northern Cheyenne PSD Class I area resulted in higher stacks and greater control efficiencies for Units #3 and #4. These units use wet scrubbers with lime injection resulting in 90 percent SO_2 control efficiency.

The company maintained an ambient network around the facility through 2001 and continues to support a tribal air monitoring program on the Northern Cheyenne reservation. SO2 monitoring at the facility was terminated after many years of measuring very low concentrations.

1.2.2.4 YELLOWSTONE COUNTY HISTORY

There are seven major sources in the Billings/Laurel area which emit SO_2. In Billings, these include Exxon Company USA (oil refinery), Conoco Inc Refinery (oil refinery), Montana Power Corrette Steam Plant (coal-fired electric power generating facility), Western Sugar Company (sugar beet factory), Yellowstone Energy Limited Partnership (coke-fired cogeneration power plant), and Montana Sulphur & Chemical Company (sulfur recovery facility). In Laurel, the major source is the Cenex Refinery (oil refinery). The combined source mix contributes to high ambient readings. In March 1978, the Laurel area was designated nonattainment for SO_2.

In December 1977, the Billings/Laurel industries and the State signed a stipulation requiring the industries to employ various control options. This stipulation, incorporated into the SIP, provided the framework to bring the area into compliance with ambient standards. Subsequent monitoring networks for SO_2 have shown the area to be in compliance with the NAAQS, but exceeding the MAAQS.

The 1977 stipulation also commissioned the Department (with industrial funding) to conduct an ambient air quality study to more fully describe the magnitude and geographical extent of the SO_2 concentrations. Another major goal of the study was to identify the relative source contributions from each industrial source.

In 1981-82, the Department (through a cooperative effort with the industries) designed and installed a SO_2 monitoring network. The network consisted of eight SO_2 monitoring sites with meteorological monitoring including upper air measurements employing acoustic radar and pilot balloons. Six of the SO_2 sites were in Billings and two were in Laurel. Using this data, the Department attempted to validate a mathematical model that could predict concentrations from the various SO_2 sources. The model failed for the following reasons: (1) a lack of good emissions data; (2) high concentrations caused by inversion breakup and direct plume impact, which the model could not handle; (3) over-prediction of plume rise by the model; and (4) very small changes in wind direction could cause large differences in predicted versus actual concentrations at receptors located close to the sources. A novel approach was developed using directional analysis and mass emissions to characterize source contributions to the annual average at the worst-case receptor (highest estimated ground-level SO_2 concentration). This was useful, but could not be applied as a predictive tool for short-term averages or at other receptors in the valley.

During 1984 to 1986, the Department explored rule-making options to bring the area into compliance with the SO_2 MAAQS. With no easy administrative solutions in sight, the Montana Legislature passed HB 534 in the 1987 session. This bill exempted the existing Billings/Laurel industries from meeting the MAAQS; they had only to meet the NAAQS (which was being met in Yellowstone County). Acknowledging the State's diminishing role in SO_2 monitoring in Billings, the legislature passed HB 878, and provided state funding for continued monitoring.

Following the 1987 Legislature session, a committee of the Billings/Laurel industries, the local chamber of commerce, and air pollution professionals united to monitor and report on the area's air quality. The Billings/Laurel Air Quality Technical Committee (BLAQTC) was formed in the spring of 1987.

The Department is a non-paying member of BLAQTC and works with the group on site selection, quality assurance, and ambient monitoring.

Due to interest by the EPA and environmental groups, the State and Billings/Laurel industries conducted peak five-minute monitoring for SO_2 during the winter of 1990-91. An EPA contractor reviewed the peak five-minute data and its relationship to the hourly averages (peak-to-mean ratios). The results of this review were inconclusive. No additional peak five-minute monitoring for SO_2 is planned by the Billings/Laurel industries. However, the State continues to collect peak five-minute SO_2 data at its sites.

In 1990, E. H. Pechan and Associates (Pechan) developed a SO_2 emission inventory for the Billings/Laurel area. The final report, submitted to EPA in 1991, indicated a large difference between actual and potential SO_2 emissions for most sources.

The City of Billings contracted with GeoResearch Inc. in 1990 to conduct a SO_2 dispersion modeling study for the Billings area utilizing recently gathered meteorological data and the Pechan SO_2 emission inventory. The results of the dispersion modeling study predicted violations of the sulfur dioxide NAAQS at both the potential to emit and maximum actual emission rates.

In 1991, Billings Generation Inc. (BGI) owned by Yellowstone Energy Limited Partnership (YELP) submitted a permit application for construction and operation of a coke-fired cogeneration power facility located adjacent to the Exxon Company USA (Exxon) Refinery. Dispersion modeling performed in support of the permit application predicted violations of the SO_2 NAAQS in the Billings' area as well as PSD increments. The permit for BGI was granted in March 1992, and required a reduction in sulfur dioxide at the Exxon Refinery.

In a March 4, 1993, letter to the Governor of Montana, EPA stated that it determined the SO_2 control plan for the Billings/Laurel area to be substantially inadequate and requiring revision. EPA based the insufficiencies on modeled SO_2 NAAQS violations from the GeoResearch Study and BGI permit application. In addition, EPA determined that the existing control plan did not provide enforceable methods to ensure compliance with the NAAQS.

DEQ, in cooperation with the Billings area SO_2 emitting industries, prepared a major revision to the Billings sulfur dioxide control plan. On May 19, 1995, the Board of Health and Environmental Sciences, now the Board of Environmental Review, adopted SO_2 control plans for six of the seven

Billings/Laurel industries. Following this adoption, a control plan for Montana Sulphur and Chemical Company and a revised plan for Exxon Company U.S.A., Billings Refinery, were developed through a contested case before the Board. As a result of the new Montana Sulphur and Exxon control plans, similar changes were necessary for the other five industries. The Board approved these modifications on August 9, 1996, and the Board made additional modifications to the Exxon control plan on February 7, 1997. The control plans established emission limits on all of the SO_2 emitting sources and required continuous emission monitors on most stacks for compliance determinations.

Sulfur dioxide emissions in Yellowstone County have leveled out at about 15,100 tons in the last couple of years.

1.2.3 LEAD

Lead (Pb) is a naturally occurring, bluish-gray metal that is found in small quantities in the earth's crust. It is emitted into the atmosphere by automotive emissions (that was phased-out), by smelters (other than iron smelters), and by manufacture of lead storage batteries. In Montana, a 120-year smelting legacy continues today.

1.2.3.1 LEWIS & CLARK COUNTY HISTORY

Lead is a pollutant of concern in East Helena where the predominant source is the ASARCO primary lead smelter. EPA promulgated NAAQS for lead on October 5, 1978. Monitoring data indicated that East Helena violated that standard. The Department conducted extensive studies in the early 1980s to determine source apportionment. and the results indicated that reentrained road dust, soil, fugitive ore concentrates, zinc oxide material, and blast furnace upsets were the primary lead contributors. EPA approved the East Helena Lead SIP, which contained control strategies expected to bring the area into compliance, on July 9, 1984.

As of December 31, 1986, all the control strategies in the plan were implemented; however, ambient air monitoring data for 1987 and 1988 indicated although lead levels decreased, they remained above the lead standard. As a result of the monitoring data, EPA notified Montana that the East Helena lead SIP was inadequate in October 1988.

From 1990 through the first half of 1995, the State, ASARCO, and American Chemet Corp. conducted ambient monitoring, emission inventory estimations, source apportionment studies, meteorological data collection, and dispersion modeling in support of a revised SIP. On August 2, 1993, EPA made a finding that Montana had failed to submit a lead SIP by July 6,

1993, for the East Helena lead nonattainment area. Therefore, sanctions were to be imposed 18 months after the finding (February 2, 1995), unless the State submitted a revised SIP and EPA determined that the revised SIP was complete within that time frame. On February 2, 1995, EPA imposed 2:1 emission offset sanctions in the East Helena lead nonattainment area. EPA received the revised SIP in August 1995 and an additional revision in July 1996. EPA is in the process of reviewing state responses to EPA comments.

1.2.4 CARBON MONOXIDE

Carbon monoxide (CO) is a colorless, odorless, and tasteless gas produced primarily during the incomplete combustion of organic fuels used for transportation and heating. Generally, it is the largest single fraction of gaseous pollutants found in urban atmospheres. Automobile exhaust is the principal source of CO emissions (60-80%) in Montana's major urban areas, with industrial emissions, and agricultural and forestry burning, as well as residential wood combustion in Western Montana, contributing sources.

Carbon monoxide is a pollutant of concern in the larger communities in Montana and in West Yellowstone due to snowmobile activity in the winter. Currently, Missoula is categorized as "moderate" nonattainment for carbon monoxide. On February 9, 2001, the Department submitted a request to EPA to redesignate the Billings and Great Falls "Not Classified" CO nonattainment areas to attainment. On February 21, 2002, EPA published a direct-final rule approving the Billings Limited Maintenance Plan. Great Falls CO redesignation approval is expect within the year. Therefore, Great Falls remains classified as nonattainment, "not classified" for carbon monoxide. Kalispell violated the 8-hour CO NAAQS in January 1996 and is under a "SIP Call." Exceedances, control plans, emission inventories, and related regulatory measures for Great Falls, Kalispell, Missoula, and Billings, in their respective counties, are discussed in detail below.

1.2.4.1 CASCADE COUNTY HISTORY

In 1980, EPA listed Great Falls as nonattainment for CO following sixteen violations of the CO standard between July 1977 and February 1979. The NAAQS for CO is 9.0 ppm for an 8-hour average concentration, not to be exceeded more than once per year. Control plans were developed to bring Great Falls back into compliance following the nonattainment designation. However, the first control plan had to be withdrawn due to the failure of Montana Refining, a major CO source at that time, to modify their catalytic cracking unit. A second control plan was submitted to EPA in 1987, but approval was never finalized, and Great Falls experienced another violation that same year. Following the 1990 Clean Air Act Amendments (CAAA), Great Falls was reevaluated based on the lack of

exceedances in 1988 and 1989 CO monitoring data. EPA listed Great Falls as a "not classified" nonattainment area for CO in 1991. That EPA action required a new emission inventory and development of a maintenance plan for redesignation to attainment.

The Department began a redesignation effort based on a "Limited Maintenance Plan" strategy (a less restrictive plan for redesignation granted to areas with low ambient CO values or "design" values, like Great Falls) and a 1996 CO baseline emission inventory. Although Great Falls does not have an approved CO control plan, a requirement for redesignation, it was determined by EPA that the 1990 CAAA superseded that requirement with the "not classified" designation. Therefore, Great Falls was allowed to continue the redesignation process with the "Limited Maintenance Plan" strategy. The primary control measure in the plan is a federal program (the Federal Motor Vehicle Emission Control Program) that continues to require cleaner vehicles from car manufacturers over time. Although vehicle miles traveled have increased in Great Falls, ambient CO concentrations have decreased over the last ten years. The plan requires that a CO monitor remain in the Great Falls area and that contingency measures be determined by local and state officials if an exceedance or violation of the CO standard occurs. The plan was approved by EPA on May 9, 2002.

In the event of an exceedance, the local and state officials will be notified of that exceedance within 60 days. The Department and local officials will recommend appropriate contingency measures based on the meteorological conditions leading up to the exceedance, information on historical exceedances of the standard, and estimated growth within the Great Falls area and vehicle emissions. The possibility of an exceptional or natural event will also be evaluated. Following the review of that information, the contingency measure(s) will be proposed for local adoption. The local adoption process will be completed within three months of the exceedance notification. However, the contingency measures will not be implemented until a violation has occurred. The measures need to be implemented within one year of the violation. Per EPA requirements, the contingency measures included in the plan are oxygenated fuels and wood stove curtailment programs. Contingency measures listed in the plan are suggested, NOT required measures.

1.2.4.2 FLATHEAD COUNTY HISTORY

In January 1996, Kalispell had an 8-hour NAAQS CO violation. DEQ submitted a draft CO emission inventory for base year 1996 to EPA in May 1997. A control plan is yet to be submitted, with completion pending

publication of the Mobile 6 Emission Factor Model. The intersection where the violation occurred was modified during the summer of 2000 to improve traffic flow. The intersection reconstruction project will be re-analyzed to measure its effect on reducing CO emissions and to determine whether oxygenated fuels would be required as a CO control measure. Kalispell has recorded no additional exceedances of the 8-hour CO standard since 1996.

1.2.4.3 MISSOULA COUNTY HISTORY

On March 3, 1978, Missoula was designated as CO nonattainment based on air quality data collected near the intersection of South Avenue, Brooks, and Russell Streets (Malfunction Junction). In August 1981, DEQ submitted a revised CO control plan that detailed a plan to bring the area into compliance. The plan called for the reconstruction of the Malfunction Junction intersection including limited turn lanes, changing timing sequences for the traffic lights, and increased vehicle speeds. Additional reconstruction was performed on a portion of Highway 93 between Mount Avenue and Reserve Street. The reconstruction was completed in late 1985.

EPA and the Department were concerned that area-wide sources such as residential wood combustion combined with traffic emissions contribute to elevated CO levels at other areas in Missoula. In July 1988, EPA notified the Department that the Missoula CO control plan was substantially inadequate. The Department and Missoula County prepared an emission inventory and submitted it to EPA in December 1989. No comments were received from EPA on the adequacy of this emission inventory.

Due to provisions in the Clean Air Act Amendments of 1990, Missoula was further classified as a "moderate" nonattainment area, in November 1991. "Moderate" areas are those that have a CO design value between 9.1 and 16.4 ppm for an eight hour average. Also, the provisions required implementation of an oxygenated fuels program.

The oxygenated fuels program was initiated October 1, 1992. On November 6, 1992, the Department submitted a revised Missoula CO control plan, based on the oxygenated fuels program. In July of 1995, EPA received the CO emission inventory utilizing 1990 base year data. Compiled Missoula reasonable further progress (RFP) emission inventories for 1993 and 1996 were completed in March 2000. Redesignation is being planned for completion by the end of 2003.

1.2.4.4 YELLOWSTONE COUNTY HISTORY

In 1978, EPA listed Billings as nonattainment for CO as a result of the 1977 Clean Air Act Amendments. The NAAQS for CO is 9.0 ppm for an 8-hour average concentration, not to be exceeded more than once per year. Control plans were developed to bring Billings back into compliance following the nonattainment designation. The CO violation was attributed primarily to motor vehicle emissions. The first CO control plan included intersection reconstruction at Exposition and First Avenue. The final CO control plan incorporated computer modeling with the reconstruction in the first plan, and was approved by EPA in 1986. Following the 1990 CAAA, Billings was reevaluated based on the lack of exceedances in 1988 and 1989 CO monitoring data. EPA listed Billings as a "not classified" nonattainment area for CO in 1991. That EPA action required a new emission inventory and development of a maintenance plan for redesignation to attainment.

The Department began a redesignation effort based on a "Limited Maintenance Plan" strategy (a less restrictive plan for redesignation granted to areas with low ambient CO values or "design" values, like Billings) and a 1996 CO baseline emission inventory. The primary control measure in the plan is a federal program (the Federal Motor Vehicle Emission Control Program) that continues to require cleaner vehicles from car manufacturers over time. Although vehicle miles traveled have increased in Billings, ambient CO concentrations have decreased over the last ten years. The plan requires that a CO monitor remain in the Billings area and that contingency measures be determined by local and state officials if an exceedance or violation of the CO standard occurs. The plan was approved by EPA on February 21, 2002.

In the event of an exceedance, the local and state officials will be notified of that exceedance within 60 days. The Department and the Yellowstone County Air Pollution Control (YCAPC) program will recommend appropriate contingency measures based on the meteorological conditions leading up to the exceedance, information on historical exceedances of the standard, and estimated growth within the Billings area and vehicle emissions. The possibility of an exceptional or natural event will also be evaluated. Following the review of that information, the contingency measure(s) will be proposed for local adoption. The local adoption process will be completed within three months of the exceedance notification. However, the contingency measures will not be implemented until a violation has occurred. The measures need to be implemented within one year of the violation. Per EPA requirements, the contingency measures included in the plan are oxygenated fuels and wood stove

curtailment programs. Contingency measures listed in the plan are suggested, not required measures.

Effective use of contingency measures also provide areas like Billings (following redesignation) with an opportunity to maintain status as an attainment area even if a violation has occurred. Whereas, without this redesignation plan, if Billings experienced a violation of the CO NAAQS, it would be designated by EPA as a full nonattainment area and be required to develop a control plan to bring the area back into attainment.

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1.2.5 NITROGEN DIOXIDE

Nitrogen dioxide (NO_2) has not been a pollutant of major concern in Montana. NO_2 is formed when nitric oxide (NO) is oxidized in ambient air. NO_x (oxides of nitrogen) is a term used to represent both NO_2 and NO. Emission inventories for point and area sources are usually expressed as NO_x whereas the standard is for NO_2.

Point sources of NO or NO_2 in the State include coal-fired power plants, natural gas compressor stations, oil refineries, and a kraft paper mill. A new source of some concern is temporary electric power generators installed in response to the rapid increase in electricity costs. Mobile sources primarily include automobile tailpipe emissions.

The Department has not monitored for NO_2 in several years. Additional monitoring by the Department would identify the current relationship of NO to NO_2 baseline conversions in airsheds subject to industrial permits. If resources become available the Department will conduct monitoring in Missoula and Billings. However, there has been some company monitoring for NO_2 required as conditions of PSD permits in Colstrip and Missoula, and are discussed below.

1.2.5.1 MISSOULA COUNTY HISTORY

The NO_2 issue in Missoula County centers on the Smurfit-Stone Container Corporation (Stone) kraft pulp mill near Frenchtown. In May 1987, the company received a PSD permit from the State to burn petroleum coke in their four lime kilns. To date, only one lime kiln has been converted to burn coke. As a permit condition, Stone Container was required to operate one NO_2 monitoring site near their facility. The data collected and submitted to the State by Stone showed very low concentrations with no violations of the NAAQS or MAAQS, and monitoring was discontinued in 1992.

1.2.5.2 ROSEBUD COUNTY HISTORY

The NO_2 issue in Rosebud County centers on Montana Power Company's four coal-fired power generating plants in Colstrip. Units #1 and #2 were permitted in 1973 by the State. Unit #1 was commissioned in October 1975 and Unit #2 in August 1976. In 1978, an EPA PSD permit and State-operating permit were issued for Colstrip Units #3 and #4. In 1999, the Colstrip units emitted approximately 32,561 tons of NO_2. Emissions remain essentially unchanged today (Appendix B). Ambient monitoring data from the plant site never indicated a risk of violating the NAAQS or MAAQS, so monitoring was discontinued at the end of 2001.

1.2.6 OZONE

Ozone (O_3) is not a pollutant of major concern in Montana. All areas of the State are considered attainment for ozone. Unlike most other pollutants, ozone is not emitted directly into the atmosphere, but results from a complex photochemical reaction between volatile organic compounds (VOC), oxides of nitrogen (NOx), and solar radiation. Both VOC and NOx are emitted directly into the atmosphere from sources within the State. Since solar radiation is a major factor in ozone production, ozone concentrations are expected to peak in the summer months.

The Department conducted ozone monitoring in Billings in 1988 and 1989, and is again considering monitoring near Billings when resources become available. Billings is an area where sources emit substantial quantities of VOC and NOx. Billings also has the hot summer days, which promote the photochemical reactions for ozone formation.

1.2.7 AIR TOXICS

Air toxics cover a far-ranging suite of hazardous substances, emitted in either gaseous or particulate phases. For many years the only air toxics measured in Montana were various heavy metals (e.g., lead, arsenic, cadmium, chromium, etc.) associated with particulate emissions from the minerals industry.

Sources of air toxics are diverse and numerous. Some point sources include the oil and gas industry, mineral extraction and processing, chemical and cement plants, and wood products industry. Some area-wide sources include dry cleaners, gas stations, residential wood combustion, and motor vehicle repair/refinishing facilities. Mobile sources include tailpipe emissions from automobiles, trains, and airplanes.

The Department and Missoula County conducted a formaldehyde screening study in Missoula for the winter of 1993-94. The study showed low atmospheric formaldehyde concentrations. Another screening study for formaldehyde was conducted in Missoula from January through December 1997. The final report for

the 1997 study was completed in 1998.

In 2000, a two-year study to investigate the relationship between volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), and $PM_{2.5}$ started in the Missoula Valley. Chemical analyses include determining anion and cation, elemental, organic and elemental carbon, and polycyclic aromatic hydrocarbon (PAH) concentrations. The final report is to evaluate the relationships between airborne pollutants (both gaseous and particulate) in the Missoula airshed and collected data will be used in a chemical mass balance source apportionment model.

Speciation of $PM_{2.5}$ began in 2001 and continues with sampling every third day. This provides ongoing analysis of metals and VOCs in Missoula's fine particulate.

1.3 NETWORK MONITORING HISTORY

From the inception of the Montana air quality program, the Department has developed and maintained an air monitoring network covering problem areas throughout the State. In the 1960s the Department used high volume samplers (hi-vols), dustfall buckets, "Montana Boxes" (for fluoride), and sulfation plates to assess ambient air quality impacts from various sources. Initial program development selected monitoring locations based on field investigations, complaints, surveys, public interest, and professional judgement of the staff.

In the early to mid-1970s, other monitoring devices were purchased. These included gas bubblers for SO_2 and NO_2, hi-vols with metal shelters (earlier versions were made of wood), and continuous analyzers (primarily for SO_2). During this time period, metals analyses began on hi-vol filters collected near smelting and mining activities.

From mid to late 1970s, the monitoring effort was refined as more sophisticated equipment became available and was deployed in the field. The State became involved in several special-purpose air pollution studies. The Department conducted the Montana Air Pollution Study (MAPS) in which extensive ambient air monitoring was performed in Anaconda, Billings, Butte, and Missoula. The purpose of the study was to relate air pollution concentrations with measured human health effects within and between the different communities. The Department published several documents detailing the results of the study.

At about the same time, the Department was also involved with investigative and background studies for the Flathead River Basin Environmental Impact Statement (Kalispell, Columbia Falls, Polson, etc.), Poplar River project (by Scobey in northeast Montana), and energy development in eastern Montana (primarily in the Colstrip area).

As a result of the 1977 Amendments to the Clean Air Act, several areas in Montana were designated nonattainment for various NAAQS based on air quality data. Air quality monitoring increased in these areas as SIPs were being developed. Field sampling, emission

inventory estimates, and dispersion modeling allowed staff to focus on worst-case or maximum concentration sites (primarily) in CO and TSP nonattainment areas.

In 1978, the EPA promulgated a standard for lead. Emphasis on lead monitoring and investigations to determine maximum concentration sites were conducted in the East Helena area as part of the original SIP. The present day East Helena TSP/lead monitoring network evolved from this study.

In 1981-82, an SO_2 surveillance network was established as a condition of the 1977 Stipulation with the Billings/Laurel industries and the State. The network, at that time, contained eight SO_2 monitoring sites equipped with meteorological sensors and one upper air station. Industrial locations, topography, wind roses, emission estimates and past ambient data were used to situate the sites in suspected maximum concentration locations or where the public may be affected.

SO_2, meteorological, TSP, NOx, and Pb monitoring networks were set up in East Helena and Colstrip which essentially encircled the point sources. These multiple site networks allowed adequate coverage (regardless of the wind direction) to determine maximum concentrations from the sources.

The Montana Air Quality Program changed further with the formation of the Standing Air Monitoring Work Group (SAMWG) in 1975, at the request of the EPA Deputy Administrator. This group was made up of people representing state and local air pollution control agencies, EPA Headquarters, and EPA regional offices. The purpose of this group was to critically review and evaluate current air monitoring activities, develop more effective air monitoring strategies, help correct identified problems, improve overall current operations, and meet projected air monitoring goals.

The SAMWG developed a number of recommendations. These were promulgated in the Federal Register on May 10, 1979 and later updated on March 19, 1986 and July 1, 1987 (40 CFR Part 58).

The areas covered included:

Appendix A - Quality Assurance Requirements for State and Local Air Monitoring Stations.

Appendix B - Quality Assurance Requirements for Prevention of Significant Deterioration (PSD) Air Monitoring.

Appendix C - Ambient Air Quality Monitoring Methodology.

Appendix D - Network Design for State and Local Air Monitoring Stations and National Air Monitoring Stations.

Appendix E - Probe Siting Criteria for Ambient Air Quality Monitoring.

Appendix F - State and Local Air Monitoring Stations Air Quality Annual Report.

Appendix G - Uniform Air Quality Index and Daily Reporting.

In the State's first Network Review (1979), the Department designated each monitoring site in the State as a National Air Monitoring Station (NAMS), a State and Local Air Monitoring Station (SLAMS) or a Special Purpose Monitoring Station (SPM). The NAMS/SLAMS network was developed to meet the four basic monitoring objectives as listed in Section 1.1 (two additional monitoring objectives have been added to this section relative to $PM_{2.5}$ monitoring).

Table 1 in Appendix A provides a narrative regarding any changes or modifications to the statewide ambient air monitoring network operated by the Department, county agencies, and some industrial entities, that occurred during Fiscal Year 2002-2003 or are proposed for Fiscal Year 2004. Table 2 of Appendix A provides a listing of current air monitoring stations operated by State, county governments, and some industries.

2.0 AMBIENT MONITORING NETWORK COVERAGE

This section addresses air quality problems and concerns within each Air Quality Control Region (AQCR) and county, as listed in Figure 2-1. It is a continuation of discussions presented in Section 1.2 regarding specific pollutants and problem areas. The Population numbers come from the 2000 census. Each of the EPA criteria pollutants is discussed individually regarding data collection and appropriate correlations.

The review analyzes pollutant emissions, ambient data, and meteorological data related to specific sites or problem areas. The review is intended to show that existing monitoring sites should continue to operate (because they still serve a purpose) or are not needed and should be terminated. There are some instances where some sites may need to be modified in order to meet an intended purpose.

The Department conducts meteorological monitoring utilizing various weather instruments to measure wind speed, wind direction, and temperature variables. The resulting parameters are used in support of the analysis of air pollution data and to estimate pollutant concentration through dispersion models. A discussion of meteorological monitoring areas is included in Section 2.7.

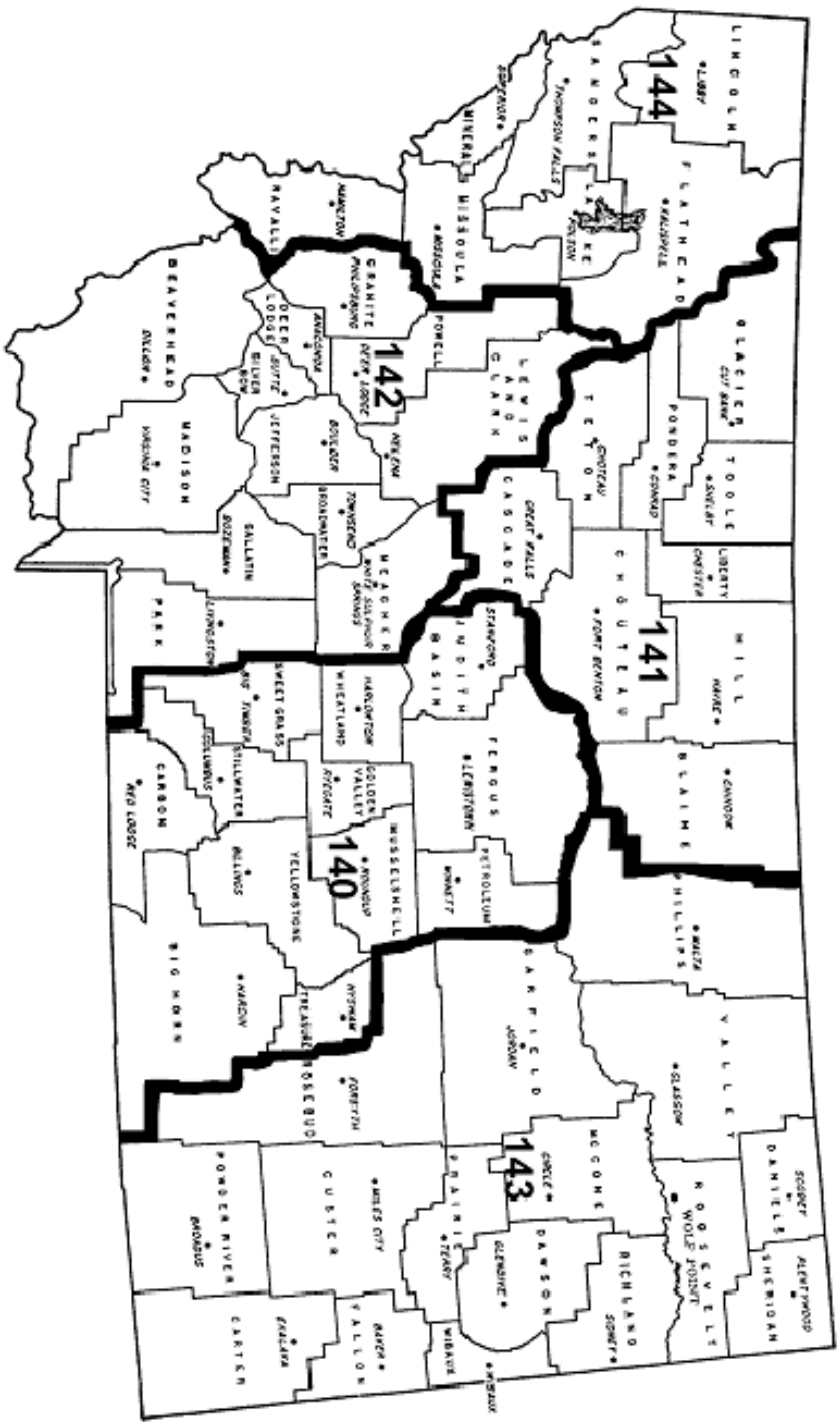


Figure 2-1
Montana Air Quality Control Regions

2.1 PARTICULATE AREAS

Particulate matter is the largest air pollution problem in the State and has historically received a high priority from the Department. In some portions of the State, there is a total suspended particulate (TSP) record dating back to 1970. From this long historical data base the Department has learned many of the significant factors that contribute to particulate pollution in Montana. It is clear that the most important factors are a combination of meteorology and topography. Mountain valleys and frequent temperature inversions often lead to particulate being trapped close to their emission source for days at a time. The ensuing particulate matter build-up has caused many communities with relatively small particulate emission rates to exceed Federal particulate standards.

In the 1970's and 1980's, a statewide TSP network was run by the Department. Data from this network proved that very few areas in the eastern portion of the State had concentrations close to primary or secondary TSP standards. Consequently, the majority of the Department's present particulate monitoring is conducted in the State's mountainous western region.

Particulate emission sources in Montana are diverse. Point sources typically can be placed into one of the following categories: coal and ore mining, non-metallic mineral processing (e.g., talc, lime, and phosphate mines), wood products industries, slash burning, and wood and coal fired power generation. Although some of these sources are significant (Appendix B), they are typically located in relatively remote areas where the threat to public health is minimal. Of greater concern in the State are area sources. Examples of area sources include reentrained road dust, residential wood combustion, and tailpipe emissions. These sources in combination with localized point sources are the cause for most of the particulate problems in Montana.

TSP particulate monitoring evolved into sampling for particulate matter less than and equal to 10 microns in diameter (PM_{10}) because of promulgation of the 1987 Federal ambient air quality standard. A similar change is happening even now as a result of the 1997 promulgation of the $PM_{2.5}$ standard. PM_{10} monitoring began in the summer of 1985, and continues, while $PM_{2.5}$ monitoring began in January 1999 at eight sites. On January 1, 2000, four new $PM_{2.5}$ sites came online in Belgrade, Great Falls, Hamilton, and Thompson Falls, bringing the $PM_{2.5}$ network to a total of 12 sites. An additional refinement of particulate monitoring was added in February of 2001 with the start of $PM_{2.5}$ speciation sampling in Missoula. Speciation is a partial chemical characterization of the collected particulate, providing insight into its source.

As part of the latest particulate NAAQS Revisions, starting in January 1998, DEQ began reporting PM_{10} data at local conditions, as well as Standard conditions, while TSP data continues to be reported at Standard conditions. $PM_{2.5}$ data is reported at local conditions.

NAAQS changes in 1997 also established a normal sampling frequency of every third

day for State and Local Air Monitoring Stations (SLAMS). The sampling frequency can be reduced to every sixth day if the site meets a waiver requirement based on statistical analysis of recorded concentrations. The statistical values, T-statistic (*t-stat*), are based on the last three years of data and are included in Table 3 of Appendix A. DEQ is requesting an exemption from the increased sampling frequency required by the revised PM_{10} NAAQS. This request is included in the Annual Network Review at the request of EPA, Region VIII, and with the understanding that the requirement for increased sampling schedule applies only to monitors that are part of Montana's SLAMS network.

There are currently seven (7) PM_{10} sites that already meet the increased sampling schedule by utilizing continuous PM_{10} monitors (TEOMs). The remaining exemption requests are based on t-stat values that are listed in Appendix A-Table 3. All sites have t-stat values that are less than the required –1.886.

In addition, the DEQ has four sites (#30-031-0008, #30-031-0012, #30-081-0001,and #30-089-0007) that operate on a 1-in-6 schedule during the summer months (2^{nd} and 3^{rd} Quarter), and increase that frequency to 1-in-3 during the winter months (4^{th} and 1^{st} Quarters). DEQ would like to maintain the current summer schedule (1-in-6) for these sites and has included them in the exemption request, but will operate all sites with increased 1-in-3 winter sampling schedules. We believe this schedule will better serve our goals as a monitoring unit and will correspond better to the $PM_{2.5}$ sampling schedule.

Table 4 in Appendix A, lists current and proposed PM_{10} network sampling frequencies. All $PM_{2.5}$ sites operate on the one-in-three sampling frequency, while all collocated $PM_{2.5}$ and PM_{10} sites run on a one-in-six sampling schedule.

The following subsections present brief descriptions of the particulate monitoring sites that have been operated or administered by the Department. Included in the descriptions are summaries of the sources that have impacted the areas; relevant topographic and meteorological information; discussions of the data collected; and future recommendations for the sites.

2.1.1 AQCR 140 - SOUTH CENTRAL MONTANA

2.1.1.1 FERGUS COUNTY

Fergus County (population 11,893) is located in central Montana and contains several outlying frontal ranges of the Rocky Mountains including the Snowy Mountains, Judith Mountains, and Moccasin Mountains. The major city in Fergus County is Lewistown (population 5,813). The topography around Lewistown is similar to a mountain valley with frequent temperature inversions, which often leads to particulate being trapped close to their emission source for days at a time. The major sources of particulate include reentrained road dust and residential wood combustion.

TSP monitoring was conducted in Lewistown from January 1980 through December 1983 and no exceedances of the standard were found.

2.1.1.2 YELLOWSTONE COUNTY

Yellowstone County (129,352) is located in south central Montana and is bisected by the Yellowstone River. The major cities in the County are Billings (population 89,847) and Laurel (population 6,255) which are located along the Yellowstone River Valley floor. On the north and south edges of the valley, the rimrocks rise abruptly above the valley floor. The valley is approximately 12 miles wide in Laurel, but on the eastern edge of Billings, the rimrocks form a constriction that is only about one mile wide. The prevailing winds are from the southwest and are channeled down the valley. The winds are usually responsible for good dispersion, but occasional temperature inversions do occur.

Particulate monitoring has been conducted in Yellowstone County since 1971. Initial sampling used the standard hi-vol samplers for TSP. Although there have been several TSP sites in Yellowstone County, only those in the central part of Billings recorded elevated concentrations.

PM_{10} monitoring in Billings started in December 1986, and continues today at the Lockwood Park (30-111-1065) site. There has never been a recorded PM_{10} exceedance at any site in Billings.

Sampling was conducted at the Diamond Parking site (30-111-0078) from November 1992 until April 1994 when the site was shut down due to site lease problems. The site was moved two blocks south and was operating at the Norwest site (30-111-0081). On the west end of Billings, Yellowstone County Air Pollution Control (YCAPC) developed the Mount Olive site (30-111-0079) which started collecting data in July 1994. Sampling for PM_{10} at Lockwood Park started in January 1996. The Department terminated PM_{10} sampling at Mt. Olive and Norwest in 1997 due to low PM_{10} concentrations. The maximum 24-hour PM_{10} concentration recorded during 1999 at Lockwood Park, was 111 $\mu g/m^3$ (reported at local conditions).

$PM_{2.5}$ sampling was started at Lockwood Park in January 1999. Since PM_{10} sampling continues at the same site it affords an opportunity to compare the two size fractions of particulate.

2.1.2 AQCR 141 - CENTRAL MONTANA

2.1.2.1 CASCADE COUNTY

Great Falls is Montana's second largest city with a population of 56,690 and

is located at the confluence of the Missouri and Sun Rivers. Topography plays an important part in the climate of Great Falls. The municipal airport and National Weather Service office are located on a plateau about 200 feet higher than downtown Great Falls, which contributes to marked temperature differences between the two. The Continental Divide to the west, and the Big Belt and Little Belt Ranges to the south are primary factors in producing the frequent wintertime chinook winds in this part of Montana. The prevalence of chinook winds creates a relatively high average wind speed, which promotes good ventilation in the community most of the time.

Particulate monitoring has been conducted in Cascade County since 1971. Initial sampling used standard hi-vol TSP samplers. There have been several TSP sites in Cascade County, but only those in the central part of Great Falls and Black Eagle had elevated concentrations.

In 1985, PM_{10} monitoring started at the Downtown site (30-013-0017) in Great Falls and the site continued until 1988. Also, PM_{10} and TSP sampling occurred at the Fire Station site (30-013-0009) during this same time frame. The Department reviewed the data and determined that the Fire Station site was the maximum concentration site for Great Falls. The Department moved the PM_{10} sampler from the Downtown site to the Fire Station in July 1988. The Department terminated PM_{10} sampling at the Fire Station site in 1997 due to low PM_{10} concentrations.

$PM_{2.5}$ monitoring began at Great Falls High School (30-013-1026) January 1, 2000. This site is in a residential neighborhood near the city's center. Fine particulate is the pollutant most likely to accumulate and become troublesome during stagnant conditions so the values coming from this site provide an excellent measure of air quality in Great Falls.

2.1.3 AQCR 142 - SOUTHWESTERN MONTANA

2.1.3.1 BEAVERHEAD COUNTY

The principal PM_{10} air quality concern in Beaverhead County centers on industrial activity six miles south of Dillon around the Barretts Minerals Inc. talc plant. Dillon is located near the center of the Beaverhead Valley. The valley floor is about 5400 feet in elevation with relatively low (6700 feet) rolling mountains located ten miles to the west. Although higher mountain ranges such as the Pioneer, Snow Crest, and Ruby are nearby, the Dillon area is open and experiences good ventilation.

In September 1984, a monitoring site for TSP was established at the Beaverhead County Courthouse (30-001-0001). This site operated for two years until June 1986. The monitoring data showed relatively low readings

and continued monitoring was not warranted.

2.1.3.2 BROADWATER COUNTY

Broadwater County is located in west central Montana. The east boundary of the County is on the crest of the Big Belt Mountains. Broadwater County is sparsely populated (4,385) with most of the county dominated by dry land farming. The Missouri River dissects Broadwater County. Canyon Ferry Reservoir on the Missouri River is the dominant feature in the county. The PM_{10} area of most concern in Broadwater County centers on the city of Townsend (population 1,867). Current particulate monitoring is limited to operating permit required monitoring at some mines.

2.1.3.3 GALLATIN COUNTY

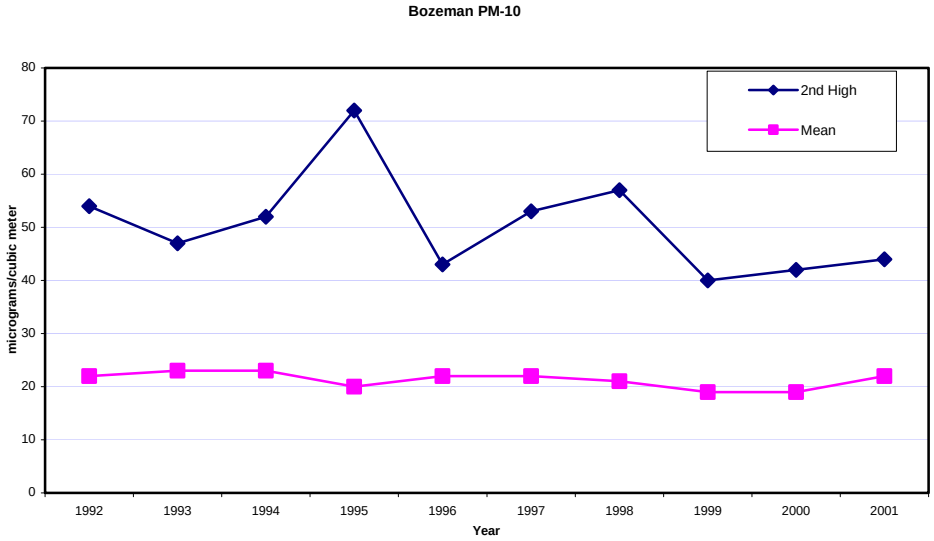
The PM_{10} areas of most concern in Gallatin County (population 67,831) center on the cities of Bozeman and Belgrade. Bozeman (population 27,509) lies at the eastern edge of the Gallatin Valley and is home to Montana State University. Bozeman does not have any major air pollution sources, but does have problems with traditional area-wide sources such as emissions from paved and unpaved roads, and residential wood combustion. Belgrade, with a population of 4,846 lies nine miles west of Bozeman. Belgrade has one major air pollution point source, the Louisiana Pacific Corporation sawmill, whose emissions include a wood-fired boiler and dust from the log deck. Belgrade's main particulate emission sources include paved and unpaved roads, residential wood combustion, and the sawmill.

The dimensions of the Gallatin Valley are approximately 12 miles wide and 20 miles long. This large area typically allows pollutants to disperse with moderate to fast wind speeds. However, during fall and winter, infrequent calm inversion conditions do allow elevated PM_{10} concentrations to accumulate around the urban areas. Also, winter road sanding contributes to elevated PM_{10} concentrations from reentrained road dust in the spring.

The Department has been monitoring for particulate matter in Bozeman since 1978. The primary site has been at the East Main City Building (30-031-0002). Other locations were also monitored for TSP, however, the East Main site proved to be the worst-case site in Bozeman at that time.

In 1985, the Department installed a PM_{10} monitor at the East Main site and in 1987, when the PM_{10} standard was promulgated, the Department discontinued all Bozeman area TSP monitoring. The Department installed a second PM_{10} sampler at the East Main site on January 11, 1991. Recently, the Bozeman area's population has exploded, creating traffic congestion and other factors that contribute to increased PM_{10} concentrations. Thus far

Bozeman has not recorded any exceedances of the PM_{10} standard, either 24-hour or annual. Recent data is displayed below. There is no discernable trend. For a rapidly developing area, we appear to be monitoring in the



wrong place. The site was closed mid-year 2002. A new site is being sought.

In Belgrade, the Department received numerous complaints and a public petition for air quality monitoring in the city. Although the community is small, it has experienced some urban sprawl from nearby Bozeman and has a major sawmill whose emissions include a wood-fired boiler and dust from the log deck. However, the main concern is centered on dust from paved and unpaved roads. The Department installed two PM_{10} samplers in a central location in an open field behind a grain elevator. Sampling started in October 1991 at the ConAgra (30-031-0008) site, and collocated sampling began in July 1997. Since sampling began readings have been low, with an occasional high reading; the highest was 137 ug/m^3 (reported at Standard conditions) on November 11, 1993. The Department added $PM_{2.5}$ monitoring to the Belgrade site on January 1, 2000. A comparison of 2000 PM_{10} and $PM_{2.5}$ values revealed a 2.5/10 ration of 0.43. This is very similar to Helena and would indicate a pretty normal ratio of smoke to dust. Both would appear to be somewhat elevated.

In the southern end of Gallatin County, West Yellowstone and Big Sky are becoming PM_{10} concerns. West Yellowstone is a main entrance to Yellowstone National Park, and experiences high traffic counts nearly year round. Particulate emissions come from dirty streets, residential wood combustion (RWC), and motor vehicle tailpipes, especially in the winter with high snowmobile traffic.

Big Sky, a rapidly growing year-round resort area, is located on the west side of the very narrow Gallatin River Canyon in the Madison Mountain Range. This area's main PM_{10} emission source is suspected to be wood smoke from RWC and summer forest fires/controlled burns.

In October 1994, a PM_{10} site (30-031-0009) was installed just east of West Yellowstone at the West Entrance Station of Yellowstone National Park. This micro-scale sited PM_{10} sampler mainly monitored snowmobile traffic travelling past the West Entrance Station. The sampler was located immediately east of the kiosk (ticket booth). Data from this site was entered into the AIRS database. The site was discontinued on March 24, 1995, following consistently low values. Carbon monoxide monitoring at the park entrance has shown that snowmobile traffic produces significant short term pollution which almost surely includes $PM_{2.5}$, so continuous $PM_{2.5}$ monitoring will be added to the CO site during the autumn of 2003. The low particulate values measured in the past probably reflect less traffic and the effect of averaging the data over 24 hours.

The Department installed a PM_{10} sampler in a vacant lot near the intersection of Firehole Avenue and Dun Raven Street. The Firehole site (30-031-0012) became operational on November 27, 1995. Measured annual averages have been around 20 $\mu m/m^3$. If all of the material being measured as PM_{10} was in fact 2.5 micrometers and smaller, the measured values would be significant. It would be useful to perform $PM_{2.5}$ measurements in the West Yellowstone community.

2.1.3.4 JEFFERSON COUNTY

Particulate concerns in Jefferson County (population 10,049) center around area sources in the northern part of the county. This part of the county serves as a bedroom community for persons living near and commuting to Helena. The northern part of Jefferson County includes the unincorporated communities of Montana City and Clancy as well as several adjacent subdivisions. These communities are located along the Prickly Pear Creek drainage with the Continental Divide range to the west and the Elkhorn Mountains to the east. The terrain tends to funnel the airflow on a north-south axis, but the area does experiences temperature inversions and calm winds.

The Montana City School has been a proposed location for several years for a PM_{10} site. This proposed site is located in northern Jefferson County near Helena and East Helena. The Ashgrove Cement Inc. plant is located a short distance northeast of this site and the ASARCO lead smelter to the north. This is a fast growing residential area with emissions from residential wood combustion and reentrained road dust that may impact the Helena area. These

area sources have the potential to cause elevated particulate concentrations.

2.1.3.5 LEWIS & CLARK COUNTY

Most particulate problems in Lewis & Clark County (population 55,716) center around the city of Helena (population 25,780) and the town of East Helena (population 1,642). These two communities are situated near the southern end of the Helena Valley. The valley is large (approximately 16 miles by 16 miles), lies east of the Continental Divide, and is surrounded by mountains on all sides. Diurnal temperature inversions and inversions lasting for a few days are common. Predominant wind direction is from the northwest through southwest.

Particulate monitoring has been conducted in Lewis & Clark County since 1957. Early sampling was performed using standard hi-vol samplers for TSP. Many years of particulate monitoring in Helena has been conducted at the Cogswell Building (30-049-0001) near the state capitol building. The Department terminated the Cogswell site on September 20, 1997 due to low PM_{10} concentrations.

There have been several other sites in Helena, some were associated with Lewis & Clark County's wood stove curtailment program. PM_{10} sampling began in Helena in 1985 when the Cogswell TSP sampler was converted to PM_{10}. Starting in 1991, the Department added the Lewis & Clark County Health Department's Lincoln School (30-049-0018) PM_{10} site to its SLAMS network. Concentrations at this site have been consistently low. A new PM_{10} site at Rossiter School (30-049-0024) in the Helena Valley started data collection on November 5, 1996.

Visibility data was collected using a nephelometer at the Lincoln School site (30-049-0018) from December 1988 to March 1993. The county used the visibility data, correlated to PM_{10} levels, to call alerts for their mandatory wintertime wood stove curtailment program. The nephelometer was replaced with a Tapered Element Oscillating Microbalance (TEOM) in October 1993. The TEOM outputs near real-time PM_{10} data. Year around data from the TEOM has been stored in AIRS since start-up and will continue indefinitely. $PM_{2.5}$ monitoring was begun at the Lincoln School site in January 1999. The Helena Valley was heavily impacted by forest fires during the summer of 2000, and the 24-hour particulate standards were exceeded on several occasions.

A considerable amount of particulate sampling has also been conducted in the East Helena area. Most of this particulate sampling has been conducted in connection with lead analyses around ASARCO's primary lead smelter. The earliest TSP/Pb monitoring in East Helena (monitoring with data submittal to

AIRS) was in 1972. Please refer to Section 2.3.1.1 for a complete discussion on current TSP/Pb monitoring and proposed network modifications in East Helena. Also, Table 4 in Appendix A lists TSP/Pb sampling frequencies in East Helena.

PM_{10} monitoring was established September 1, 1997 in Lincoln at Lincoln 1st Bank (30-049-0025). Lincoln is located west of the Continental Divide in the Blackfoot River Valley. Lincoln is situated in a deep, narrow river valley in a mountainous area with limited air dispersion and little control over open burning and residential wood burning. The Lincoln area typically experiences numerous inversions and poor visibility during the winter months. A maximum 24-hour PM_{10} concentration of 130 $\mu g/m^3$ (reported in local conditions) was measured in 1999. The highest concentrations have occurred during the late autumn, winter, and early spring. This timing implies that smoke is the most likely pollutant, but it does not exclude an occasional dusty day caused by winter traction material. $PM_{2.5}$ sampling colocated with the PM_{10} sampling during 2002 found that almost all of the material being collected during this time period is $PM_{2.5}$, and that the fine particulate standard is the one most likely to be exceeded. The 1st Bank site was discontinued at the end of 2002, and a $PM_{2.5}$ site began operation at the Parker Clinic on the west end of Lincoln.

2.1.3.6 SILVER BOW COUNTY

Butte is a city with an urban population of approximately 34,000. The elevation averages 5300 feet with the Continental Divide surrounding the city on three sides. Wind speeds in Butte are usually low and the area is susceptible to temperature inversions in the fall and winter. The old part of Butte is built on a hillside next to the Berkeley Pit mining area and the new part of town is built on the valley floor to the south.

Particulate monitoring has been conducted in Silver Bow County since 1971. In 1978-80, the Department conducted TSP monitoring in Butte as part of the Montana Air Pollution Study (MAPS). The network consisted of five sites in the city center. The Department observed that the city center sites and specifically the Greeley School site (30-093-0005) had the highest particulate concentrations. The Department decreased its network to this single site in 1984. The Department started daily PM_{10} sampling at the Greeley School site in September 1987.

In January 1991, the Department established the Butte-Greenhouse site (30-093-0008) located near the Harrison Avenue-Interstate 90 intersection, because the 1991 SIP identified this location in the maximum emission grid. However, during the two years of operation, the Greenhouse site consistently had lower readings than the Greeley School site. With EPA approval, the

Department shut down the Greenhouse site at the end of June 1992.

Visibility data was collected using a nephelometer at the Butte-Greeley School site (30-093-0005) from July 1989 to March 1993. The visibility data, correlated to PM_{10} concentrations, was used by the Butte-Silver Bow County Health Department (BSBHD) to call air pollution alerts for their mandatory wintertime wood burning curtailment program. The BSBHD nephelometer was replaced with a TEOM that started operating in August 1993. Year around data from the TEOM has been stored in AIRS since start-up. Manual PM_{10} sampling was discontinued in 1997. $PM_{2.5}$ monitoring was begun at this site in February 1999.

2.1.4 AQCR 143 - EASTERN MONTANA

2.1.4.1 RICHLAND COUNTY

The air quality concerns in Richland County (population 9,667) center around Sidney. Sidney (population 4,274) is situated close to the Yellowstone River near the North Dakota border. In the late 1970's and early 1980's, the area experienced an economic upturn due to oil and gas exploration and development. Other industrial sources in the Sidney area include Montana Dakota Utilities (coal-fired power plant) and Holly Sugar Corporation (sugar beet processing facility).

In 1983, the Department installed a hi-vol sampler in downtown Sidney (30-083-0010). This site operated until September 1987. At that time the PM_{10} standard had been promulgated by EPA and the Department felt that its resources were better applied to PM_{10} problems in the western valleys.

2.1.4.2 ROSEBUD COUNTY

The air quality concern for particulate in Rosebud County (population 9,383) centers around the cities of Colstrip and Ashland. In the vicinity of Colstrip there are five coal-fired power generating plants and two large coal mines. Montana Power Company Colstrip (Colstrip), Western Energy Company, Colstrip Energy Limited Partnership (CELP), and Big Sky Coal Company have operated particulate sampling networks around their facilities as conditions of their permits. In Ashland, there have been recent concerns due to area sources including wood and coal burning stoves.

The Department requested Montana Power (in Colstrip) to install and operate a PM_{10} site at their MPC Site #3 (30-087-0700). Two samplers (reporting and collocated) were installed in December 1989 and the data was submitted to the Department. The TSP samplers at MPC Sites #1 & #2 (30-087-0701 and -0702, respectively) were replaced with PM_{10} samplers in July 1992. At that

time the Department required MPC to operate the PM_{10} samplers at all sites on an every third day sampling schedule. In July 1994, MPC requested that the Department review their Colstrip PM_{10} network. As a result of that review, changes were allowed starting on July 1, 1995. The PM_{10} sampling frequency at Site #1 was reduced to once every sixth day and the PM_{10} sampling at Site #2 was terminated. The long history of low values led to termination of Site #1 in 2002.

2.1.5 AQCR 144 - NORTHWESTERN MONTANA

This part of Montana is very mountainous and heavily forested. The valleys of northwestern Montana have the poorest atmospheric dispersion in the State, and high particulate concentrations historically have been a problem in this area. Two areas were originally designated nonattainment areas for TSP and now AQCR 144 has eight PM_{10} nonattainment areas. The Department has devoted considerable time and resources to solving the particulate problem in northwest Montana.

2.1.5.1 FLATHEAD COUNTY

The particulate problems in Flathead County (population 74,471) center on the communities in the greater Flathead Valley. These communities include Columbia Falls, Kalispell, and Whitefish.

Columbia Falls is an industrial town of 3,645 people located in the northeast corner of the Flathead Valley. In the vicinity of Columbia Falls are a plywood-particle board-sawmill complex, an aluminum reduction plant, and two other sawmills. Wind patterns in the area are dominated by drainage winds through Badrock Canyon to the east and through a gap north of town which drains the North Fork of the Flathead River. The area is susceptible to temperature inversions in the fall and winter months.

Particulate monitoring has been conducted in Columbia Falls since 1971. Initial sampling was performed using standard hi-vol TSP samplers. The two principal sites were at the Anders Residence (30-029-0005) and the Junior High School (30-029-0003). In May 1985, the Department installed a PM_{10} sampler at the Junior High School. The Anders Residence site was closed in 1987 after collected TSP data from both sites were compared and determined they were measuring the same air mass.

Data from the PM_{10} samplers at the Junior High School site showed no violations of either the annual or short-term PM_{10} standards from 1988 through 2002. Complaints about dust from a bark processing facility on the north edge of town lead to informal sampling in the nearby neighborhood starting in July 2000, and ultimately to the establishment of a new monitoring site just south of the bark processing facility. PM_{10} values from the new site

proved to be consistently higher that the old Jr. High School site, so it was closed at the end of 2002.

Kalispell has a population of 14,223 persons, and the majority of the 74,471 county residents live within a 15-mile radius of the city. Kalispell serves as a business, service and shopping center for the greater Flathead Valley. The Flathead Valley is located west of the Continental Divide and is a fairly wide valley (14 miles across). The climate is mild with calm or low wind speeds and the area is susceptible to temperature inversions in the fall and winter.

Particulate monitoring has been conducted in Kalispell since 1971. From 1977 to 1982, Kalispell was one of the communities involved with the Flathead River Basin Environmental Impact Statement (EIS). Monitoring was conducted at several locations in the basin and it was determined that most of the high concentration sites were associated with anthropogenic sources in the city centers.

Visibility data was collected using a nephelometer at the Courthouse East site (30-029-1017) in Kalispell from January 1991 to March 1993. The nephelometer was used to estimate particulate levels for the voluntary wintertime wood burning curtailment program. The nephelometer was replaced with a TEOM in October 1993. Year round data from the TEOM has been stored in AIRS since start-up. In 1995, this site was shut down and the TEOM moved to the Kalispell Universal Athletics (30-029-1015) PM_{10} site. On June 27, 1995, EPA approved the Department's request to replace manual PM_{10} samplers at selected sites with TEOMs.

The Universal Athletics site had problems with adequate airflow, security, and convenience. In response to these problems, the TEOM was moved to the new central Kalispell site at Flathead Electric (30-029-0097) on July 1, 1999. A comparison of manual PM_{10} data from the Universal Athletics site with TEOM data from the Flathead Electric site indicated that the Flathead Electric site adequately represented the area, so the Universal Athletics site was closed in June 2001.

Another PM_{10} site was developed northeast of Kalispell along U.S. Highway 2 at the Evergreen Fire Station (30-029-0043). A Plum Creek sawmill and plywood plant is located 0.5 mile west of the site. This site started operation in June 1994 and produced some mid-range PM_{10} concentration values. In 1998, the sampler was collocated and the sampling frequency was increased. The resulting site was overcrowded and in poor condition. Review of the data showed that while the siting was source oriented, the measured values had never been very high and had been declining each year. Since the site was representative of only a small population and the source did not warrant monitoring, the Evergreen Fire Station site was terminated at the end of

1999.

$PM_{2.5}$ monitoring in Kalispell was first conducted at the Evergreen Fire Station site starting in January 1999. Space problems and the desire for a site more representative of population exposure led to a decision to relocate the $PM_{2.5}$ monitors to the new Flathead Electric site, which is nearer the city's center. This move was completed in June of 1999

Whitefish is a city of approximately 5,032 people located in the northwest corner of the Flathead Valley. Whitefish is not a major commercial or industrial center, but a year around tourist destination. The area is susceptible to temperature inversions in the fall and winter months.

As part of the Flathead River Basin EIS, the Department measured TSP in Whitefish from 1981 to 1983. The data showed that the area was in compliance with the TSP NAAQS. However, the Department believed that the site was not located in the maximum concentration area. As a result of the 1990 Network Review, the Department installed a PM_{10} site located in the central business district of Whitefish at Markus Foods (30-029-0039). Since sampling began in April 1991 numerous PM_{10} exceedances have been recorded at the Markus Foods site. An exceedance was recorded at Markus Foods on March 24, 1997 with a measured value of 178 $\mu g/m^3$.

To confirm the Markus Foods site as the maximum concentration PM_{10} site, a PM_{10} saturation study was done during February through April 1993. Eleven sites, most were located in areas with potentially high PM_{10} levels, were chosen and portable saturation samplers were deployed. The results of the study revealed that elevated PM_{10} levels occurred in the general downtown area and on south U.S. Highway 93, with no statistical difference between the two areas. A TEOM was placed at the Markus Foods site in August 1995 with a manual PM_{10} sampler. A collocated manual PM_{10} was installed on January 1, 2000 to replace the collocated site lost due to Evergreen Fire Station site closure. $PM_{2.5}$ monitoring was begun in January 1999 at Markus Foods. A maximum 24-hour $PM_{2.5}$ value of 27 $\mu g/m^3$ (reported in local conditions) was measured in 1999.

Structural changes at Markus Foods and a growing business in roasted chicken (the resulting smoke was vented to the roof) forced closure of the site in March of 2001. A replacement site in the downtown area was not possible, and a new site was established on U.S. 93 where it enters downtown. A comparison of $PM_{2.5}$ values from the new site after its first full year of operation with the Markus Food site's two full years of operation, yielded an annual average of 9.2 micrograms/cubic meter at the new site vs. 10.7 at Markus Food. Considering the limited data and knowing that broiler smoke was being vented to the roof at the old site, it seems reasonable to

tentatively conclude that the sites are comparable. Maximum 24 hour values also appear comparable. Limited data capture for PM_{10} precluded a similar comparison of sites.

2.1.5.2 LINCOLN COUNTY

The particulate problems in Lincoln County center on the communities of Eureka, Libby, and Troy.

Eureka is a small town in northwestern Montana with a population of approximately 1,100. The town is situated in rolling hills along the Tobacco River approximately five miles upstream from Lake Koocanusa. Particulate monitoring for TSP started in 1984. Twenty-four hour concentrations exceeded the short-term TSP NAAQS on a few occasions. In 1987, the Department replaced the TSP sampler with a PM_{10} sampler and sampling continued through June 1992. Since PM_{10} levels were low, sampling was discontinued.

Libby is a small town with a population of approximately 2,626. It is located along the Kootenai River in northwestern Montana. The Kootenai Valley runs approximately east to west in Libby and is only about 2 miles wide. The Libby area may have the worst ventilation of any community in Montana. During the fall and winter months, winds are almost always calm or light. The light winds with the persistent temperature inversions contribute to the significant accumulation of particulate in the narrow valley.

Particulate monitoring has been conducted in Libby since the mid-1970s. The principal TSP sites were at the Brown Residence (30-053-0010) and the Lincoln County Courthouse (30-053-0012).

In May 1985, the Department installed a PM_{10} sampler at the Courthouse site; in August 1985, the Department discontinued the TSP sampler at the Brown Residence. Data analysis revealed that hi-vol TSP samplers at the Lincoln County Courthouse and the Brown Residence sites were measuring the same airshed.

Visibility data was collected using a nephelometer at the County Courthouse Annex site (30-053-0018) in Libby from December 1986 to October 1993. The nephelometer was operated by the Lincoln County Health Department and was used to call alerts for their mandatory wintertime wood burning curtailment program.

The Department replaced the nephelometer with a continuous PM_{10} TEOM monitor at the Lincoln County Annex site (30-053-0018), which is one block east of the Courthouse site. The TEOM began operating in October 1993 and

was used for the Libby RWC curtailment program, the Montana Smoke Management program, and to correlate data with the PM_{10} samplers at the Courthouse. On April 1, 1995, the Courthouse site was shut down. The TEOM became Libby's primary SLAMS PM_{10} compliance monitor. $PM_{2.5}$ was added at the Courthouse Annex site in January 1999 and the samplers were collocated a year later. Measured winter-time $PM_{2.5}$ values are the highest in Montana, and it appears unlikely that Libby will be in compliance with the $PM_{2.5}$ NAAQS. To better understand the situation and identify the source of the particulate, $PM_{2.5}$ speciation sampling was started in February 2002. The problem is a large amount of volatile organic carbon associated with the fine particulate during the winter months. The source has not been determined.

Troy is a small town 18 miles west of Libby with a population of approximately 1,000. The town is situated along the Kootenai River Valley and like Libby has some of the worst ventilation in the State. In October 1991, the Department installed two samplers at the high school (30-053-0019) in the northwestern part of town. Readings were consistently low for the three years that the site was operated. The site was shut down June 30, 1995.

2.1.5.3 MISSOULA COUNTY

Particulate problems in Missoula County center on the city of Missoula. Missoula is situated at the confluence of the Bitterroot and Clark Fork Rivers in western Montana. The city proper has a population of approximately 51,000, but the Missoula Valley contains approximately 75,000. The Missoula Valley is fairly narrow, approximately 6 miles across, and effectively isolated from the larger Bitterroot Valley north of Lolo. The valley is susceptible to temperature inversions in the fall and winter months and wind speeds are normally low throughout the year.

Particulate monitoring in Missoula has been conducted since 1971 at several sites in the Missoula Valley. During the early and mid 1970's, the highest concentrations were measured in the downtown area at the Courthouse Roof site (30-063-0001).

Over the years, the air-monitoring network in Missoula has been quite extensive and comprehensive. The Missoula City-County Health Department (MCCHD) has monitored for particulate at several locations and has operated sites in Bonner (near a major sawmill/plywood factory), in Lolo (at the waste water treatment plant), near Frenchtown (by a kraft pulp mill), in East Missoula, in the Rattlesnake area, in southwest Missoula near the south hills, and on the western edge of the city. In 1984, MCCHD also started collecting PM_{10} data at their Rose Park (30-063-0020) and Boyd Park (30-063-0024)

sites in addition to TSP data. The maximum PM_{10} concentration recorded in 1984 was 257 $\mu g/m^3$ at Rose Park. In 1985, the County Health Department (30-063-0031) TSP site was established and PM_{10} sampling started in 1987.

Continuous PM_{10} data has been collected in Missoula since 1987 using continuous PM_{10} monitors (Beta attenuation type and TEOM) at the Boyd Park site. The continuous PM_{10} data has been submitted to AIRS since 1992. Missoula local government personnel use the continuous PM_{10} data and forecast information from the National Weather Service to make predictions for their mandatory wintertime residential wood burning curtailment program. In 1995, the Boyd Park TEOM became the site's primary compliance and SLAMS monitor. $PM_{2.5}$ monitoring, primary and collocated, began in February 1999. $PM_{2.5}$ speciation began on a one in three schedule in March of 2001.

$PM_{2.5}$ monitoring was also started on the Health Department roof (30-063-0031) in February 1999. This site is shared with a manual PM_{10} sampler operating every six days.

Following a Health Department building renovation in 2001, the monitoring network was restructured for greater efficiency. Since analysis of the $PM_{2.5}$ data shows little difference between the Health Department and Boyd Park, all $PM_{2.5}$ monitoring was moved to the Health Department roof. PM_{10} monitoring at the Health Department became continuous using the TEOM relocated from Boyd Park. At Boyd Park, PM10 sampling continues using a manual sampler on a one in six schedule (see Appendix A-Table 3 for t-stat calculations).

The emission inventories developed in the 1992 SIP showed that the highest particulate concentration grids were in south Missoula (where the Boyd Park site is located) and in downtown Missoula (where the Health Department site is located). The Department and the MCCHD will continue to operate these two sites to track compliance with the NAAQS.

MCCHD operates two PM_{10} sites (in cooperation with Stone Container) near their Frenchtown kraft pulp mill. These sites were operated as TSP sites until May 18, 1992, when the samplers were switched to PM_{10} samplers.

The Department installed a PM_{10} monitor in Lolo (Lolo Lube Center #30-063-0035) with siting oriented toward “hot spot” traffic monitoring. Data collection began on August 4, 1997 and ended in June 2000. Over the period of operation, the maximum 24-hour value detected was 52 $\mu g/m^3$ with the annual average was at about 15 $\mu g/m^3$ (both reported at local conditions).

The Bonner/Milltown area is separated from the Missoula Valley by Hell

Gate and has significant wood products industry in a narrow valley. MCCHD began $PM_{2.5}$ sampling at Lions Park in Milltown in August 2002 to see if a problem existed.

2.1.5.4 RAVALLI COUNTY

Particulate concerns in Ravalli County center around the city of Hamilton. Hamilton is a small (population 3,705), but rapidly growing community situated in the center of the Bitterroot Valley. Hamilton is about 50 miles south of Missoula and about 300 feet higher in elevation. Hamilton often experiences better wintertime ventilation than nearby Missoula. There are times, however, when temperature inversions in Hamilton can trap pollutants and cause elevated levels.

In 1983, the Department began TSP sampling at the Ravalli County Courthouse (30-081-0001) in the city center. Sampling was initiated due to citizen complaints about dust and wood stove emissions. In 1986, the Department installed a PM_{10} sampler at the same location and continued to collect TSP and PM_{10} data until 1987.

On July 31, 1987, the EPA promulgated new standards for PM_{10}. Due to the low concentrations recorded at the Hamilton site, the Department discontinued both TSP and PM_{10} monitoring during the fall 1987.

Due to the growing population and renewed citizen concerns, the Department reopened the Ravalli County Courthouse PM_{10} site (30-081-0001) in June 1994. A second site, MT Gold Realty (30-081-0002) was installed two blocks away adjacent to U.S. Highway 93 and began operation in July 1994. The MT Gold site has consistently produced PM_{10} values higher than the Courthouse site. Neither site measured PM_{10} concentrations that exceeded the NAAQS. The Department terminated the Courthouse site on July 31, 1997, due to low PM_{10} concentrations. While the MT Gold Realty site showed higher particulate concentrations than the Courthouse site, the values were not high, and the trend was toward steadily declining values. With the decision to add $PM_{2.5}$ monitoring in Hamilton and the development of electrical problems at the MT Gold site, the Department terminated MT Gold on October 6, 1999 and reopened the Courthouse site. The Courthouse site is more representative of the community and far superior in terms of access and reliable operation. PM_{10} sampling resumed at Hamilton Courthouse on October 9, 1999 and $PM_{2.5}$ sampling started on January 1, 2000.

The Bitterroot National Forest voluntarily started two new PM_{10} sites in the Bitterroot Valley to measure forest related burn activities on the valley's air quality. One site is located at the Stevensville-Ranger Station (30-081-0003) approximately 30 miles south of Missoula. This site uses a TEOM to provide

continuous data. Low PM_{10} values have been consistently reported since the site started in July 1994. The other site is located at the West Fork Ranger Station (30-081-0004) along the West Fork of the Bitterroot River south of Darby and about 20 miles south of Hamilton. This site proved difficult to support during the forest fires of 2000, so the West Fork Ranger Station site was closed. Construction of a new "fire cache" warehouse forced relocation of the Stevensville-Ranger Station site a short distance north and east in 2001.

2.1.5.5 SANDERS COUNTY

Particulate concerns in Sanders County center around the city of Thompson Falls. Thompson Falls is a small town with a population of approximately 1,500 persons. It lies on the north side of the Thompson Falls Reservoir, a small impoundment on the Clark Fork River. The Clark Fork Valley around Thompson Falls runs east and west; mountains rise to 7000 feet both to the north and south of Thompson Falls. Like other western Montana valleys, the area experiences severe temperature inversions during the fall and winter months.

The Department conducted limited TSP monitoring in the early 1970's and again in 1978. It was not until 1983 that the Department established a permanent TSP site at the Sanders County Courthouse (30-089-0003). Readings collected during the first few years showed levels exceeding the NAAQS for TSP. In 1985, the Department installed a PM_{10} sampler at the same location. The PM_{10} data from 1985 to 1987 was limited, but did record concentrations approaching the proposed NAAQS for PM_{10}.

In February 1988, the Sanders County Courthouse site recorded a PM_{10} concentration in excess of the 24-hour PM_{10} standard. The Department initiated daily sampling in July 1988, which continued until July 1, 1992. In 1990, CMB monitors were installed at the Railroad site (30-089-0005), and at the Muster Ranch site (30-089-0006).

A decision to re-roof the courthouse forced the Department to remove the site on July 8, 1999 and create a new site at the High School. The new Thompson Falls High School site (30-089-0007) started PM_{10} sampling October 3, 1999 and $PM_{2.5}$ sampling was added beginning January 1, 2000.

2.2 SULFUR DIOXIDE AREAS

As mentioned in Section 1.2.2, there are only four areas in the State where SO_2 is an issue or

concern. These are the Billings/Laurel area in Yellowstone County, East Helena in Lewis & Clark County, Great Falls in Cascade County, and Colstrip in Rosebud County.

2.2.1 AQCR 140 - SOUTH CENTRAL MONTANA

2.2.1.1 YELLOWSTONE COUNTY

The sulfur dioxide issue in Yellowstone County has been with the air quality program since its inception in the mid to late 1960s. Early monitoring with sulfation plates and SO_2 analyzers showed that the Laurel area exceeded air quality standards and the Billings area measured elevated levels.

Billings and Laurel are situated along the Yellowstone River Valley in south central Montana, which runs southwest to northeast and is a predominant topographical influence on the airflow in the area. In Billings, cliffs or rimrocks located both north and south of the river cause channeling. The distance between the north and south rims of the cliffs range from about one to five miles. In Laurel, the valley tends to be a little wider and the predominant high terrain is not close by. The cities of Billings and Laurel including all of the industrial sources are located along the river valley. Nearby terrain is often higher than the highest smokestacks.

Wind roses in the area are reflective of the valley orientation. The predominant wind direction is from the southwest with northeast being the second most predominant direction. As with many areas in Montana, the area experiences inversions in the fall and winter months. This causes pollutants to become trapped and build up for extended periods. Inversion breakup occurring after sunrise causes built-up concentrations to lower to the ground and results in elevated readings measured at the monitoring stations. With frontal passage or higher wind speeds, winds can cause plumes to directly impact the ground resulting in high SO_2 concentrations.

In 1981-82, the Department (through a cooperative effort with the industries) designed and installed a sulfur dioxide monitoring network. The network consisted of eight SO_2 monitoring sites with meteorological monitors and an upper air site employing acoustic radar and pilot balloons. Six of the SO_2 sites were in Billings and two were in Laurel.

Following the 1981-82 study, the SO_2 monitoring network was scaled down in various stages until it reached a minimum early in 1987. The network was scaled down to four sites in 1983: Coburn Road (30-111-0066), Lockwood Park (30-111-0065), North Johnson Lane (30-111-0064) and Taft School (30-111-0064). It should be noted that no sites were kept in the Laurel area since the two sites in the 1981-82 study showed compliance with the NAAQS and MAAQS. The Department felt that greater emphasis was

needed in the Billings/Lockwood area. In December 1983, the Taft School site was shut down to reduce the operator's workload in Billings. The network of three continued until June 1986 when a leasing problem caused the Department to shut down the North Johnson Lane site. In January 1987, the Department shut down its Lockwood Park site due to further cutbacks of personnel in the Billings office. At that time the network was reduced to a single site, Coburn Road, which has been the backbone of the network.

The 1987 Legislature provided additional funding and the State was able to add one additional site, Scottish Rites (30-111-0073), to its network. At the same time, the six Billings/Laurel industries combined resources to address SO_2 issues including monitoring. The Billings/Laurel Air Quality Technical Committee (BLAQTC) was formed in the spring 1987. BLAQTC hired a contractor, purchased equipment and installed three SO_2 monitoring stations. Two of the sites were in Billings, Lockwood Park (30-111-1065) and Coulson Road (30-111-2004), and one was in Laurel, Laurel-BLAQTC (30-111-0016). By the end of 1987 the combined State and BLAQTC network consisted of five sites.

In November 1988, the Department started collecting peak five-minute SO_2 averages for each hour. The EPA met with the Department and BLAQTC in February 1990 and offered two SO_2 analyzers to conduct peak monitoring in the range from 1 to 5 ppm. In September 1990, the Department and BLAQTC installed one of these monitors at the Coburn Road site and the other at the Lockwood Park site. These monitors collected peak five-minute data for six months until March 1991. Peak data was also collected at the other three sites with analyzers in the range of 0 to 1 ppm. After completion of the study, an EPA contractor reviewed and analyzed the data; the results were inconclusive. The Department continues to collect peak five-minute SO_2 data, but none is collected at the industry sites. For the calendar year of 2002 the Department is collected and reported not just the maximum five minute value in each hour, but all of the five minute values in each hour.

The 1987 monitoring network remained the same until October 1989. Upon agreement with the Department and BLAQTC, the Scottish Rite site was moved to Ponderosa School (30-111-0076) and the Coulson Road site was moved to Brickyard Lane (30-111-2005). The group felt that the old sites had served their purpose and that higher SO_2 concentrations might be found at the new sites. The EPA approved all of these sites in a letter dated May 14, 1990.

On June 30, 1992, the Ponderosa School site was shut down due to low readings. EPA approved this action in a letter dated June 22, 1992. The Ponderosa monitoring shelter was moved to the Coburn Road location, approximately 30 feet west of the existing air monitoring trailer. In an

attempt to reduce vandalism, the instruments in the original Coburn Road trailer were moved to the new (e.g., old Ponderosa) shelter on October 1, 1992. The old Coburn Road trailer was surplused.

Dispersion modeling for the Billings Generation Inc (BGI) facility operating permit, indicated elevated SO_2 levels in the Lockwood area. The Department reviewed and refined the results of the modeling studies and concluded that additional SO_2 monitoring sites were needed. At the location of the modeled maximum SO_2 "hot-spot" the Department installed an SO_2 monitor. The site, Sacrifice Cliff (30-111-0080), was approved by EPA effective May 19, 1993, and data collection began at that time. Also, as a result of the permitting process, BGI operates SO_2 monitors at two other modeled "hot-spots". The first one, Johnson Lane (30-111-2006), is located near Johnson Lane, south of I-90, and east of the existing Lockwood Park site. The second site, Pine Hills (30-111-2007), is located east of the I-90/I-94 junction, in the elevated terrain near the Pine Hill School. EPA approved both sites on March 7, 1994 with data collection starting on November 2, 1993.

The Sacrifice Cliff site measured the highest SO_2 values in the system through 1996 when a change to low sulfur coal at the BGI facility resulted in a dramatic drop. Since then it has consistently measured lower values than the Coburn Road site. The Sacrifice Cliff site was terminated in June 2001.

A consortium of Billings' industries installed an SO_2 analyzer at the Mt. Olive site with data collection starting on December 1, 1995. This group also started a new site at Senior High School (30-111-2008) with CO, SO_2 and meteorological monitoring. SO_2 data collection at Senior High began December 26, 1995. Sampling at the Mt. Olive and Senior High sites were discontinued on July 1, 1997.

In August 1999, an additional SO_2 site began operation on Coburn Road approximately 0.5 mile north of the existing Coburn Road Site. The new station, Lower Coburn Road (30-111-0083), was predicted to have moderately high concentrations with high frequency. Three years of data reveal a very low annual average, and very infrequent high concentrations. This site will be terminated during the summer of 2003.

To better document population exposure and monitor trends, DEQ reopened the Mt. Olive site in the growing, west end of Billings. The site began monitoring SO_2 and CO in October 2001. SO_2 monitoring was also added to the Bridal Shop site (30-111-0082) which has been monitoring only CO. At this time Billings has CO and SO_2 monitoring both downtown and in the west end.

There has been substantial development on the high ground to the north of

the Yellowstone Valley. The development has been accompanied by pollution complaints. Considering the frequency of light south winds during the summer and the relationship of this population to the refinery stacks, it seems wise to evaluate population exposure to SO_2 in this area. A new site (30-111-0084 Beartooth School) will begin monitoring during the summer or 2003.

2.2.2 AQCR 141 - CENTRAL MONTANA

2.2.2.1 CASCADE COUNTY

The SO_2 issue in the Great Falls area became apparent as the result of dispersion modeling performed in support of a permit application by Montana Refining. The Wire Mill Road site (30-013-2000) began reporting valid data on November 14, 1994. However, dispersion modeling conducted in 1999 determined the monitoring site should be lower and closer to the refinery. As a result of the modeling, a new site, Race Track (30-013-2001) was established and began reporting valid data on May 4, 2000.

2.2.3 AQCR 142 - SOUTHWESTERN MONTANA

2.2.3.1 LEWIS & CLARK AND JEFFERSON COUNTIES

In East Helena, the industrial source of SO_2 is a primary lead smelter. The Helena Valley is a fairly wide valley (approximately 16 miles by 16 miles) and lies east of the Continental Divide. The valley is surrounded by mountains and experiences significant temperature inversions in the fall and winter months. East Helena is located at the southern end of the valley. Predominant wind directions are from the northwest through southwest.

Monitoring by ASARCO in the 1970's revealed exceedances of the SO_2standard in the East Helena Area. At that time ASARCO operated six monitoring stations in the East Helena area.

From 1974-1982, the Department operated three SO_2 sites adjacent to ASARCO's sites. After the acid plant was installed and the new blast furnace baghouse stack was built, ambient concentrations dropped dramatically and the State discontinued their sites. In 1991, ASARCO operated six SO_2 monitoring stations in the East Helena area including Kennedy Park (30-049-0703), East Station (30-049-0711), Kleffner Road (30-049-0701), Water Tank (30-049-0702), Microwave Tower (30-043-0903), and Ash Grove Siding (30-043-0908).

In 1992, dispersion modeling performed as part of the SIP revisions indicated

that potentially high ambient SO_2 levels were occurring in the elevated terrain to the southwest and southeast of the smelter, in Jefferson County. As a result of the modeling, the ambient SO_2 monitoring network was significantly revised in the spring of 1993, and consisted of thirteen SO_2 sites.

On June 30, 1997, monitoring was discontinued at Ash Grove Siding (30-043-0908), Kleffner Road (30-049-0701), Top of Microwave Hill (30-043-0909), McClellan Creek Road #3 (30-043-0910), McClellan Creek Road #5 (30-043-0912), McClellan Creek Road #7 (30-043-0914), McClellan Creek Road #8 (30-043-0915), and McClellan Creek Road #9 (30-043-0916). Following these changes the ASARCO SO_2 Network consisted of five active sites including Microwave (30-043-0903), Water Tank (30-049-0702), Kennedy Park (30-049-0703), McClellan Creek Road #4 (30-043-0911), and McClellan Creek Road #6 (30-043-0913). This reconfigured network was adequately distributed to show attainment and maintenance of the NAAQS and MAAQS.

In April of 2001 the ASARCO smelter was shut down for an indeterminate period removing any significant SO_2 source in the Helena Valley. SO_2 monitoring was suspended when the smelter stopped operation.

2.2.4 AQCR 143 - EASTERN MONTANA

2.2.4.1 ROSEBUD COUNTY

The sulfur dioxide issue in Rosebud County centers on Montana Power Company's (MPC) four coal-fired power generating plants in Colstrip. The topography of the area is semi-rugged to rolling terrain. The area sometimes experiences temperature inversions, but generally receives good airflow and is usually well ventilated.

The company maintains an ambient network around the facility and supports a tribal air monitoring program on the Northern Cheyenne reservation. The tribal network consists of three sites: Morning Star (30-087-0760), Garfield Peak (30-087-0761), and Badger Peak (30-087-0762). MPC operates three SO_2 sites. These are at MPC #1 (30-087-0701), MPC #2 (30-087-0702), and MPC #3 (30-087-0700). MPC #4 (30-087-0704) was shut down on June 30, 1992 and the termination was approved in an EPA letter dated April 3, 1992. Years of data from the sites around the facility revealed that any impact is much farther out, and SO_2 monitoring at the facility was discontinued at the end of 2001.

2.3 LEAD AREAS

2.3.1 AQCR 142 - SOUTHWESTERN MONTANA

2.3.1.1 LEWIS & CLARK COUNTY

Lead is a pollutant of concern in East Helena where the primary source is the ASARCO lead smelter. After promulgation of ambient air quality standards for lead, the East Helena area violated the lead standard based on ambient monitoring.

Recent TSP/Pb network modifications include the following: the Microwave (30-043-0903) TSP/Pb background site was shut down on June 30, 1991; and the Hadfield site (30-049-0719) was shut down on April 1, 1993, with the equipment moved to the current Prickly Pear site (30-049-0727). Prickly Pear is a site located directly north of the ASARCO smelter, across U.S. Highway 12, west of Prickly Pear Creek on Pacific Street. This site is near the modeled maximum Pb concentration site (modeling conducted with the assumption that all the SIP control strategies have been implemented). Prickly Pear started data collection as a collocated site in November 1993. In 1998, Prickly Pear recorded quarterly averages of 0.9 :g/m^3 for all four quarters, the largest values of the ASARCO monitoring network. The Prickly Pear Pb site became a NAMS site July 1, 1999.

On July 1, 1995, cadmium, arsenic, zinc, copper, nickel, and chromium analysis began on the filters collected at Firehall. At the start of 1999, the monitoring network consisted of the following four sites: Firehall (30-049-0714), Dartman Field (30-049-0724), Old Railroad (30-049-0726), and Prickly Pear Creek (30-049-0727). Dartman Field was lost to development and reclamation on October 5,1999, and in response, Pb sampling was added to Kennedy Park (30-049-0703) about 200 meters to the west in September 1999. Prickly Pear consistently measured higher Pb values than the near by Firehall and Kennedy Park sites, so at the end of December 2000 the network of TSP/Pb samplers was reduced to Prickly Pear and Old Railroad. These sites operated through the end of 2001. Following the suspension of smelting, lead values dropped precipitously and no longer warranted monitoring.

2.4 CARBON MONOXIDE AREAS

Carbon monoxide is a pollutant of concern in the larger communities in Montana. The Department, in cooperation with county air pollution agencies, monitors for CO in Butte, Billings, Great Falls, Kalispell, and Missoula. Also, a CO monitor is stationed at the West Yellowstone entrance to Yellowstone National Park. Most high concentrations occur in wintertime months due to stagnant weather conditions, cold temperatures, and poor fuel combustion from the various sources. As part of the network review process, the Department has looked at other communities where CO may be a problem. Descriptions of carbon

monoxide monitored sites and potential monitored areas are discussed in the following sections.

2.4.1 AQCR 140 - SOUTH CENTRAL MONTANA

2.4.1.1 YELLOWSTONE COUNTY

In Yellowstone County, the city of Billings is situated along the Yellowstone River Valley, which runs from southwest to northeast and is a predominant topographical influence on the airflow in the area. Located both to the north and south of the river are cliffs or rimrocks that cause channeling. The distance between rims is about one mile wide where the downtown area is located.

In 1978, the Billings downtown area was designated nonattainment for CO due to high readings at the 27th & Montana monitoring site (30-111-0053). Data collected at the Metra Parking Lot site (30-111-0061), during the two years following the modifications to Main Street (1985-86), indicated compliance with the NAAQS and the Department submitted a redesignation request.

EPA informed the Department that a maximum concentration microscale site needed to be established and that all locations needed to show maintenance and attainment of the NAAQS in order to process the redesignation request. Attempts to locate a new EPA-approved site followed a somewhat convoluted path. EPA wanted a site just north of the 4th Avenue entrance to the Metra Parking Lot. Permission could not be obtained primarily due to traffic and safety concerns. A site was temporarily located near the Main Street-6th Avenue North intersection (30-111-0074), but soon after it started operation, water pipes and valves were unearthed below the monitoring shelter. It was decided that this site was impractical considering future access to the water valves.

After a lengthy approval process, EPA granted permission to locate a microscale CO monitor just south of the 4th Avenue North entrance to the Metra Parking Lot (30-111-0075). Carbon monoxide data was collected from October 1988 to November 1992 and did not record any exceedances of the MAAQS or NAAQS.

In order to show attainment and maintenance of the standard at all locations, the Yellowstone County Air Pollution Control conducted CO grab sampling studies during the winters of 1988-89 and 1989-90, and a CO saturation study in December 1991. The last study identified three maximum CO concentration areas: 1) the west side along 24th Street West; 2) the downtown business district along North 27th Street; and 3) Grand Avenue

and 15th Street. As a result of the EPA approved saturation study the Department and the Yellowstone County Air Pollution Control program installed two new CO monitoring sites in Billings during the fall of 1992 and terminated the Metra CO monitoring site (30-111-0075).

The west side site, Mount Olive (30-111-0079) was located on 24th Street West just north of Central Avenue. It began operation in November 1992 after approval by EPA in a letter dated February 5, 1993. The Mount Olive site was discontinued July 1, 1997 due to low readings. It was reopened in October 2001 to track the CO trend in the growing, west end. The downtown site, Diamond Parking Lot (30-111-0078), was located on North 27th Street, between 3rd & 4th Avenues. It also began operation in November 1992 and was approved by EPA in a letter dated April 2, 1993. The Diamond Parking Lot site was discontinued on April 8, 1994, and the Norwest site (30-111-0081) was established, across 27th Street and one block south, in the same area. Following EPA approval, data collection started at the Norwest site on April 25, 1994.

In 1995, a consortium of Billings industries started a site at Senior High School (30-111-2008) with CO, SO_2 and meteorological monitoring. The Senior High site was discontinued on July 1, 1997 due to low ambient readings.

The latest site, Bridal Shop (30-111-0082) was installed on Grand Avenue near the intersection of Grand Avenue and Division and valid data collection began on December 11, 1997. Termination of the Norwest site occurred in July 1999, because the nearby Bridal Shop site had superior air flow and was recording higher 8-hour averages.

2.4.2 AQCR 141 - CENTRAL MONTANA

2.4.2.1 CASCADE COUNTY

In Great Falls, a corridor along 10th Avenue South was designated nonattainment for CO in September 1980 due to high readings at the Midas Muffler site (30-013-0015) located at 10th Avenue South and 9th Street. This site ran from 1977 until 1979 when a leasing problem forced the State to relocate the monitor about twelve blocks east to the Great Falls Federal site (30-013-0021). This site operated until 1983 when the monitoring trailer was again moved to the Pardis Clinic site (30-013-1023). The Pardis site was located one block west and across the street from the original Midas Muffler site. The Department anticipated higher concentrations at this site because it was located at a lower elevation and the traffic volume on this section of 10th Avenue South was higher.

Sampling at the Pardis Clinic site began in November 1983 and was established as a middle scale site. In May 1987, and again in August 1987, EPA informed the State that "in order to determine whether an area is attaining the NAAQS, a control agency must locate at least one monitoring station in the area of maximum concentration." EPA interprets such a location for CO to be a microscale site. On November 4, 1987, the Department moved the probe to be within microscale siting. The site remained microscale until November 16, 1988, when the site was moved back to middle scale at the landowner's request.

Carbon monoxide data collected at the Pardis Clinic site showed a few exceedances of the 8-hour standard from 1986-88. A review of the exceedances showed that most occurred in the evening hours with light to calm winds. In 1983, a staff review of data showed that area-wide sources could be contributing to the elevated readings.

Since microscale siting at the Pardis Clinic could not be continued, the Department moved the CO trailer about a block west on 10th Avenue South at the Skyway Conoco site (30-013-1025) on November 9, 1989. EPA approved this site modification request in a letter dated November 2, 1989. This microscale site operated through June 2001.

The Department and Cascade County conducted a saturation study in January 1992 to determine a maximum concentration CO site in Great Falls. The results from this study were generally inconclusive. Although, there was one location a few blocks east of the existing Skyway Conoco site that had slightly higher CO concentrations, the differences in the concentrations were statistically insignificant. Most of the concentrations recorded during the study were low due to windy conditions that resulted in excellent atmospheric ventilation. The dispersion conditions during the study are typical of those in Great Falls most of the year.

In 1999, the highest 1-hour concentration was 7.8 ppm, and the highest 8-hour concentration was 3.6 ppm. Reconstruction of 10th Avenue South was completed in June of 2000, and improved traffic flow. Traffic counts and intersection “wait times” indicated that maximum concentrations probably occurred near the 2nd st. and 10th ave. intersection. DEQ moved the Skyway Conoco site in July 2001 to escape its existing siting problems and monitor this new projected “hot spot”. A comparison of the first year of data from the new Overlook Park site (30-013-0001) with the older data from Skyway Conoco suggests that it may have slightly higher peaks of slightly shorter duration.

2.4.3 AQCR 142 - SOUTHWESTERN MONTANA

2.4.3.1 GALLATIN COUNTY

West Yellowstone, located at the southern end of Gallatin County, represents a main artery to Yellowstone National Park. In 1998, the West entrance accounted for 38% or 1.2 million of the total 3.1 million annual visitors to the park. West Yellowstone, at an elevation of 6,666 feet, is located in a circular topographic depression known as a caldera. The entrance area and highway corridor into the park are relatively flat, rimmed with 30-40 foot lodge pole pines, and the Madison River flows nearby.

In October of 1998, the Department installed a microscale carbon monoxide special purpose monitoring station on the northeast side of the park entrance (30-031-0013). The major monitoring emphasis at startup was mobile emissions from snowmobiles during the winter months; however, the station is in operation year round. January 1999 summary statistics presented a total of 19,639 snowmobiles entered the park, of which 13,794 or 70% entered through the West entrance. The west entrance counted 46,800 snowmobiles entering the park during the 2001-2002 winter, indicating a substantial growth in traffic.

To date, no exceedances of the 1-hour and 8-hour NAAQS or MAAQS have been recorded at the station. The highest 1-hour reading observed is 18.2 ppm making it appear unlikely that the 1-hour standards will be exceeded. The situation with regard to the 8-hour standard is not so encouraging. The highest 8-hour average measured is 8.9 ppm which is definitely pushing the 9.0 ppm NAAQS. It is entirely likely that the the 8-hour standard will be exceeded under high traffic conditions with very poor dispersion.

In the northern end of Gallatin County lies the Gallatin valley, home to the cities of Bozeman and Belgrade. The Gallatin valley, and the area around Bozeman in particular, has been experiencing explosive growth over the last 10 years. According to the 2000 census, Gallatin County grew 34% from 1990 to 2000. Bozeman (population of 27,509), located at the eastern edge of the valley, houses the main campus of Montana State University (12,000 students). The Department recognizes the need for a winter-time CO saturation study in Bozeman during an inversion.

2.4.3.2 SILVER BOW COUNTY

Butte has an urban population of approximately 34,000 persons. The elevation averages 5300 feet with the Continental Divide surrounding the city on three sides. Wind speeds in Butte are usually calm and the area is susceptible to severe temperature inversions in the fall and winter. The old part of Butte is built on a hillside next to the Berkeley Pit. The new part of

town is built on the "flats" to the south where much of the strip development is located. Harrison Avenue is a street that links uptown with the flats. Interstate 90 is a major east/west highway that slices through the lower part of town with off-ramps to Harrison Avenue.

In 1978-79, the Department operated a site at Hebgen Park (30-093-0018) and the highest 8-hour concentration recorded was 7.8 ppm. In 1987-88, a SPM site for CO was operated on Continental Drive (30-093-0022) near the main entrance to the Berkeley Pit and within a few blocks of the Department's PM_{10} site at Greeley School (30-093-0005). The highest 8-hour reading was 9.1 ppm. Neither site was considered a maximum concentration site for CO.

The Department conducted a CO saturation study in Butte for about two weeks in mid-December 1995. The study showed the highest CO concentrations on Harrison Avenue near the Interstate. The Department has established a CO monitoring site, Storm Sewer (30-093-0053), at the probable high concentration location at the intersection of Dewey and Harrison Avenue. Valid data collection began November 7, 1997. The Department feels this monitor is adequately stationed to record maximum CO concentrations in the Butte area, and there are no plans for an additional monitor.

2.4.4 AQCR 144 - NORTHWESTERN MONTANA

2.4.4.1 FLATHEAD COUNTY

Kalispell has a population of approximately 14,223 persons although the majority of the 74,471 county residents live within a 15-mile radius of the city. Kalispell serves as a business, service and shopping center for the greater Flathead Valley. The Flathead Valley is located west of the continental divide and is a fairly wide (14 miles across) valley. The climate is mild with calm or low wind speeds. Like many communities in the western part of the State, the area is susceptible to temperature inversions in the fall and winter. Two major highways serve Kalispell; Highway 2, an east/west route, and Highway 93, a north/south route. These two highways meet at a stoplight in Kalispell at Main Street (Highway 93) and Idaho Avenue (Highway 2). The queuing time for this intersection can be lengthy, allowing motor vehicles to idle for extended periods, emitting large quantities of CO.

Residential wood combustion in Kalispell is common as much of the community has easy access to wood from local forests. The CO emitted by traffic at the Main Street-Idaho Avenue intersection combined with the area-wide contribution from wood stoves has the potential to create elevated concentrations of CO.

The Department conducted a CO saturation study in Kalispell from December 16, 1994, to January 2, 1995. In part because of the saturation study results a CO monitoring site (30-029-0045) was established near the intersection of Idaho and Main in Kalispell with data collection beginning on October 31, 1995. Two exceedances of the 8-hr CO NAAQS were recorded at the Idaho and Main site in January 1996. In 1999, the highest 1-hour concentration was 9.1 ppm, and the highest 8-hour concentration was 5.3 ppm. Reconstruction of the intersection to improve traffic flow and reduce queuing time forced the Department to remove the Idaho and Main site March 31, 2000.

A second CO site, Laser School (30-029-0046), was established in Kalispell with data collection beginning November 1, 1996. Laser School was sited as neighborhood scale to help define the extent of the CO problem in Kalispell. The Laser School site was terminated June 20,1999 because of air flow issues created by three large Fir trees. A new site, Flathead Electric (30-029-0097), was established three blocks to the south on June 24, 1999. The Flathead Electric site is designed to meet the neighborhood scale siting criteria, and again is planned to assist in defining the geographic extent of the CO problem in Kalispell. It has been found that the Flathead Electric site frequently approaches the peak concentrations measured at the Shopko site after a lag time. The CO appears to be widely distributed under stagnant conditions.

The 1994 CO saturation study in Kalispell identified a second possible problem area as the intersection of Idaho and LaSalle. This is where the main east-west road through Kalispell, Idaho Street (Highway 2), turns into LaSalle (Highway 2) and heads toward Glacier National Park. The equipment from the Idaho and Main site was moved to a location about 100 yards west of this intersection and reborn as the Shopko site (30-029-0048) with data collection starting April 4, 2000. The Department chose to evaluate this intersection while the Idaho and Main intersection was under construction. After two winters of monitoring CO, the Shopko site does not appear to be appreciably different from the Idaho and Main site. The Department decided to collect at least one more year of data before evaluating the effect of redesigning the Idaho and Main intersection. The data comparison below (following page) would indicate that the Shopko site has lower CO concentrations than what was seen at Idaho and Main prior to altering the intersection. The Shopko site will be moved back to the area of the original Idaho and Main site during the summer of 2003.

Kalispell - Carbon Monoxide

Comparison of old and New Monitoring Sites

	Idaho & Main				Shopko			
	One Hour Average		Eight Hour Average		One Hour Average		Eight Hour Average	
Year	highest	2nd high	highest	2nd high	highest	2nd high	highest	2nd high
1997	6.2	6.1	4.9	4.9				
1998	6.6	6.5	5.3	5.0				
1999	9.1	7.9	5.3	4.8				
2001					6.0	5.7	3.8	3.7
2002					5.4	5.3	3.4	3.3
Ave	7.3	6.8	5.2	4.9	5.7	5.5	3.6	3.5

2.4.4.2 MISSOULA COUNTY

Missoula is situated at the confluence of the Bitterroot and Clark Fork Rivers in western Montana. The city has a population of approximately 51,000 persons. The Missoula Valley is fairly narrow (approximately 6 miles across) and similar to other western Montana valleys because it is susceptible to temperature inversions in the fall and winter months. Wind speeds are calm or low throughout much of the year and allow pollutants to acccumulate.

The city of Missoula was designated nonattainment for CO based on high concentrations recorded at the intersection of Brooks (U.S. 93), Russell, and South streets. This intersection and the monitoring site are known as Malfunction Junction (30-063-0005). Exceedances of the 8-hour CO standard have also been observed at other air monitoring sites in Missoula: Boyd Park (30-063-0024), in the downtown area on Higgins Avenue (30-063-0023), and Lions Park (30-063-0019).

The Malfunction Junction site was temporarily shut down in July 1983 and reactivated in January 1986 after the completion of the reconstruction. The CO data collected from 1986 to 1992 showed some exceedances of the 8-hour CO standard.

A second CO site in Missoula operated at Boyd Park in the southern part of the city operated from August 1981 to March 1991. It was suspected that most emissions measured at this site were from residential wood combustion although CO from traffic may also have contributed. In May 1991, the Department made a request to EPA to permanently shut down the site. The site had not measured an 8-hour CO exceedance since 1987 and the site was in the same general area as the maximum concentration site Malfunction Junction.

EPA responded to the Department's request in a letter dated August 8, 1991. They disapproved of the proposal to permanently shut down the Boyd Park CO site. EPA needed additional documentation that Malfunction Junction is the maximum CO location and a second CO monitoring site in Missoula was not necessary (e.g., that Malfunction Junction can adequately address all contributing sources to the CO problem in Missoula, whether they are mobile, point or area sources). The Department provided EPA with additional justification in a letter dated September 16, 1991. EPA agreed to the Boyd Park shut down request in a letter dated October 4, 1991.

During December 1992, the Department and Missoula County conducted a CO saturation study in Missoula. The final report was submitted to EPA on April 20, 1993. EPA's response, in a letter dated May 24, 1993, states, "We agree, the study confirms the Malfunction Junction intersection has the highest carbon monoxide levels in the Missoula area and the existing monitoring station know as "Malfunction Junction" is the maximum concentration monitoring station."

The Department has no plans for a second CO monitoring site in Missoula and intends to operate only the Malfunction Junction site for maintenance purposes. There have been no measured exceedances in Missoula since the implementation of the oxygenated fuels program in October 1992. The station currently operates first and fourth quarters, and is offline second and third quarters.

2.5 NITROGEN DIOXIDE AREAS

As mentioned in Section 1.2.5, nitrogen dioxide is not a pollutant of major concern in Montana. There are, however, four areas in the State where NO_2 was recently monitored by companies as a permit condition. These areas are in Colstrip, Missoula, Roundup, and Hardin.

2.5.1 AQCR 143 - EASTERN MONTANA

2.5.1.1 ROSEBUD COUNTY

The nitrogen dioxide issue in Rosebud County centers on Montana Power Company's four coal-fired power generating plants in Colstrip. The topography of the area is semi-rugged to rolling terrain. The area sometimes experiences temperature inversions, but generally receives good airflow and is usually well ventilated.

The company maintained an ambient network for NO_2 around the facility through 2001, and continues to support a tribal air monitoring program on the

Northern Cheyenne reservation. Nearly twenty years of data collection around the facility never revealed significant NO_2 in the area. The facility clearly had no local NO_2 impact, so monitoring was terminated in 2001.

2.5.2 AQCR 144 - NORTHWESTERN MONTANA

2.5.2.1 MISSOULA COUNTY

Missoula is situated at the confluence of the Bitterroot and Clark Fork Rivers. The Missoula urban area is home to nearly 62,000 persons. The Missoula Valley is similar to other western Montana valleys in that it is susceptible to temperature inversions in the fall and winter months.

The nitrogen dioxide issue in Missoula County centers on the Smurfit-Stone Container (Stone) kraft pulp mill near Frenchtown. In May 1987, the company received a PSD permit to burn coke in a lime kiln. As a permit condition, Stone Container was required to operate one NO_2 monitoring site near their facility. The data collected and submitted to the State by Stone showed very low concentrations with no violations of the NAAQS or MAAQS. The NO_2 monitoring was discontinued at Stone's request on June 1, 1992 due to low ambient concentrations. Monitoring will resume when another lime kiln is converted to burn coke.

Recently proposed changes at the Louisiana –Pacific facility are expected to increase NO_2 emissions and have forced the company to do background monitoring in the Frenchtown area. Monitoring for ozone and nitrogen oxides started January 2001. This background information is expected to support permit decisions in the Missoula Valley for the near future.

2.6 OZONE AREAS

Ozone (O_3) is not a pollutant of major concern in Montana. All areas of the State are considered attainment for ozone. Unlike most other pollutants, O_3 is not emitted directly into the atmosphere, but results from a complex photochemical reaction between volatile organic compounds (VOC), oxides of nitrogen (NOx), and solar radiation. Both VOC and NOx are emitted directly into the atmosphere from sources within the State. Since solar radiation is a major factor in O_3 production, O_3 concentrations peak in the summer months.

Ozone has been monitored in Billings, Great Falls, Butte, Colstrip, Glacier National Park, and Missoula by several different organizations. Much of the data collected in the 1970's is not credible due to the older style analyzers used and poor quality assurance.

2.6.1 AQCR 140 - SOUTH CENTRAL MONTANA

2.6.1.1 YELLOWSTONE COUNTY

Billings is in an area where sources emit fairly large quantities of VOC and NOx. Billings is also an area where hot summer days may promote photochemical reactions. EPA defines the ozone monitoring season for Montana as June 1 to September 30.

The Department first monitored for ozone in Billings at the 27th and Montana monitoring site (30-111-0053) from September 1975 to July 1978. Several hourly concentrations exceeded the MAAQS, but none exceeded the NAAQS.

The Department conducted ozone monitoring in Billings from July 1978 to August 1980 at the Central Park monitoring site (30-111-0059). A couple hourly concentrations exceeded the MAAQS, but none exceeded the NAAQS.

The Department conducted ozone monitoring in Billings in the city center from January 1988 to September 1989 at the Scottish Rites monitoring site (30-111-0073). Ozone data collected at the Scottish Rites site showed higher concentrations in the summer months, but all were within the NAAQS. One hourly concentration exceeded the MAAQS. The Scottish Rites site (which also monitored for SO_2) was discontinued in September 1989 because the ozone readings were low. Since the Scottish Rites site was discontinued, the Department has not conducted ozone monitoring. If resources become available, the Department would like to conduct ozone monitoring east of Billings.

2.6.2 AQCR 141 - CENTRAL MONTANA

2.6.2.1 CASCADE COUNTY

Montana Power Company conducted ozone monitoring in Great Falls from June 1980 to October 1981. The site (30-013-0302) was located just north of Great Falls and one mile west of Belt Creek. Three hourly concentrations exceeded the NAAQS.

2.6.3 AQCR 142 - SOUTHWESTERN MONTANA

2.6.3.1 SILVER BOW COUNTY

The Department conducted ozone monitoring in Butte at the Alpine West monitoring site (30-093-0015) during the summer and fall 1977. Many exceedances of the NAAQS (one-hour concentrations) were recorded.

The Department conducted ozone monitoring in Butte at the Hebgen Park #2

monitoring site (30-093-0018) from May 1978, to April 1981. No exceedances of the MAAQS or NAAQS were recorded.

2.6.4 AQCR 143 - EASTERN MONTANA COUNTY

2.6.4.1 ROSEBUD COUNTY

The Department conducted ozone monitoring in Colstrip at the BN monitoring site (30-087-0027) from 1975 through 1977. Also, the Department conducted ozone monitoring in Colstrip at the McRae monitoring site (30-087-0028) in 1974 and 1975. Many exceedances of the NAAQS (one-hour concentrations) were recorded at the BN site, while no exceedances of the NAAQS or MAAQS were recorded at the McRae monitor.

2.6.5 AQCR 144 - NORTHWESTERN MONTANA

2.6.5.1 FLATHEAD COUNTY

The National Park Service is conducting non-EPA Federal ozone monitoring in Glacier National Park (30-029-8001). Ozone monitoring was from April 1989 to December 1992 and March 1995 to the present. No exceedances of the MAAQS or NAAQS have been recorded.

2.6.5.2 MISSOULA COUNTY

The Department conducted ozone monitoring in Missoula at the Lions Park monitoring site (30-063-0019) in 1978 and 1979. No exceedances of the MAAQS or NAAQS were recorded. If resources become available the Department would like to establish ozone monitoring in the Missoula area.

2.7 METEOROLOGICAL MONITORING AREAS

2.7.1 AQCR 140 - SOUTH CENTRAL MONTANA

AQCR 140 is located in south central Montana and includes physical features common to all of the other AQCRs in the State. The Yellowstone and Musselshell Rivers cut through the region from west to east and the Missouri River forms the northern border. The Highwood, Big Belt, Crazy, and Absaroka Mountains border the region to the west. The southern border of the region includes the Beartooth, Pryor, and Big Horn Mountains. To the east the boundary cuts through rolling plains and foothills, and includes the lower portion of the Musselshell River.

Due to the diverse nature of the terrain and climate in this region, dispersion characteristics are variable. Mountainous terrain can provide shelter from prevailing

winds and severely limit dispersion of pollutants in one area while funneling high winds into another to greatly enhance the dispersion. Temperature inversions, which trap pollutants, are common in this region throughout the year, but the depth, duration and intensity vary widely from the mountains to the plains. Inversions on the plains seldom persist past noon, and are usually shallow and weak. Inversions in the mountainous areas are usually much stronger and deeper, and can persist for several days during the fall and winter. Low-level wind speed and direction patterns in the mountains are affected by terrain and generalizations or comparisons to any existing measurements at other sites are not very practical. Wind patterns on the flatter portion of the region can be evaluated by comparison to existing sites and generally show the prevailing winds to be from the west and southwest.

2.7.1.1 YELLOWSTONE COUNTY

Meteorological monitoring in Yellowstone County consists of two sites operated by the Department, one site operated by the Yellowstone County Air Pollution Control (YCAPC), two sites operated by Yellowstone Generation Inc. (YGI), and three sites operated by a group of Billings/Laurel industries (BLAQTC).

As stated previously, Billings and Laurel are situated along the Yellowstone River Valley in south central Montana. The Yellowstone River Valley runs from southwest to northeast and is a predominant topographical influence on the airflow in the area. In Billings, there are cliffs or rimrocks located both north and south of the river, which also tend to cause channeling. The distance between the north and south rims of the cliffs range from about one to five miles. In Laurel, the valley tends to be a little wider and the predominant high terrain is not close by. The cities of Billings and Laurel and all of the industrial sources are located along the river valley. Nearby terrain is often higher than the highest smokestacks.

The Department operates a 10-meter meteorological (met) tower at Coburn Road (30-111-0066). Temperature data (two meter probe height) is also collected at the site. The Coburn Road site is situated about 300 feet above the valley floor on the south rims. The wind data is used to determine which source or sources contributed to SO_2 readings at the site. The wind data was also used in connection with the area wide SO_2 dispersion modeling study.

The YCAPC operates a met sensor at the Bridal Shop CO site (30-111-0082). The met sensor is on a six-foot tripod on top of the monitoring shelter. The site does not meet siting criteria for probe height, but the met data is used for reviewing the meteorological conditions contributing to high CO readings.

BLAQTC operates meteorological systems at its three SO_2 sites in Billings

and Laurel. These sites are Brickyard Lane (30-111-2005), Laurel Farm (30-111-0016) and Lockwood Park (30-111-1065). All meteorological equipment is located on 10-meter towers. Analog signals are recorded on chart with the digital signal being stored on magnetic disk. The wind data is used to determine which source or sources contribute to SO_2 readings at the site. The wind data was used in the area wide SO_2 dispersion modeling study.

YGI operates meteorological systems at both of its SO_2 sites in Billings. These sites are Johnson Lane (30-111-2006) and Pine Hills (30-111-2007). All meteorological equipment is located on 10-meter towers. Analog signals are recorded on chart with the digital signal being stored on magnetic disk. The wind data is used to determine which source or sources contributed to SO_2 readings at the site.

2.7.2 AQCR 141 - CENTRAL MONTANA

AQCR 141, located in north central Montana, is a region of rolling glaciated plains. The Marias, Milk, Missouri, and Teton Rivers cut across the region from the west to east creating substantial river valleys that are hundreds of feet lower than the upland bench areas. Relatively small, isolated mountain ranges, the Bear Paw, Highwood, and Little Rocky Mountains, rise up from the plains in the eastern half of the region. The western boundary of the region is formed by the Continental Divide and includes most of the area known as the Rocky Mountain Front. The foothills of the Big and Little Belt Mountains form the southern boundary along with the Missouri River. The eastern boundary cuts across the plains north of the Little Rocky Mountains to the Canadian border, which is the northern boundary of the region.

With the exception of the isolated mountainous areas most of the region experiences a similar climatological regime with warm dry summers and cold dry winters interrupted by occasional chinooks. Dispersion potential in the region is generally excellent due to persistent and often very strong winds. Temperature inversions in the area, though frequent, are usually shallow and seldom last past noon. The exceptions to this rule are to be found in the mountainous areas and occasionally in the river valleys. During the winter it is possible to have a warm wind blowing along a bench while cold air remains trapped in the bottom of a valley only a few miles away. Persistent inversions have also been noted in the narrow valleys of the Little Rocky Mountains. The wind flow over the region is generally from the west or southwest unless cold northerly winds are sweeping down from the arctic. Precipitation amounts are uniformly low over the entire region.

2.7.2.1 CASCADE COUNTY

Meteorological monitoring in Cascade County consists of the Race Track site (30-013-2001) located east of the Montana Refining facility in Great Falls. The Race Track site met sensors are on a 10-meter tower. The wind data

analog signal is digitized and stored on magnetic media. The met data is used to review the meteorological conditions contributing to high SO_2 readings.

Meteorological monitoring is conducted at the Overlook Park site using a sonic anemometer on the shelter roof. The data is not of modeling quality, but it is useful at the microscale CO site.

2.7.3 AQCR 142 - SOUTHWESTERN MONTANA

AQCR 142 is located in the southwestern corner of Montana. The region contains several distinct mountain ranges separated by wide valleys. The valleys run north and south and can be thousands of feet lower than the surrounding mountains. Tributaries for the Clark Fork, Missouri, and Yellowstone Rivers have their headwaters in this area.

The mountainous terrain in the region substantially impacts the weather patterns. Precipitation is often limited to the higher mountains while the valleys remain arid and relatively dry. Winds along the mountaintops are generally westerly and frequently will not reach down into the north-south running valleys. Inversions are frequent and during the fall and winter can persist for days at a time. Occasional severe inversions can be several thousands of feet deep and very strong allowing almost no dispersion of pollutants. This allows even small emission sources to produce localized areas of poor air quality.

2.7.3.1 GALLATIN COUNTY

Meteorological monitoring in Gallatin County consists of a Climatronics sonic wind system at the West Yellowstone CO station located at the entrance to Yellowstone National Park. The wind system is mounted on a six foot tripod on top of the monitoring shelter. Collected data is not used for regulatory modeling, as it does not meet siting requirements. However, the meteorological data is used to review atmospheric conditions that prevail during elevated CO concentrations recorded at the site.

2.7.4 AQCR 143 - EASTERN MONTANA

AQCR 143 is basically the eastern third of Montana. Rolling glaciated plains cover the northern half of the region while rolling sedimentary plains cover the southern half. The Missouri River cuts from west to east in a deep valley in the glaciated northern half of the region while the Yellowstone River travels to the northeast in a wide, but shallow valley through the southern half. The terrain is often quite rough, but generally does not produce noticeable terrain effects on the meteorology and climatology of this region.

The weather is typical of the northern Great Plains with hot dry summers and cold

dry winters. Chinooks occur, but are not as frequent as they are in AQCR 141. Precipitation totals are generally low throughout the region with thunderstorms producing a significant amount of the total precipitation. The wind patterns here can be characterized by existing off-site measurements and are usually westerly. Dispersion in this region is excellent as a rule. Shallow and short-lived inversions are frequent especially in the southern part of the region.

2.7.5 AQCR 144 - NORTHWESTERN MONTANA

AQCR 144 makes up the northwestern corner of Montana and is entirely west of the Continental Divide. The terrain here is uniformly mountainous, as is AQCR 142, but the valleys are generally narrower and lower than the valleys within AQCR 142. The mountain ranges and valleys also run from the north to the south with the mountaintops thousands of feet higher than the valley floors. The area is drained by the Clark Fork and Kootenai Rivers and includes all of the Flathead and Bitterroot drainage.

The strong pacific influence and mountainous terrain in the region substantially impact the weather. Precipitation amounts here are the highest in the State and the winters are also warmer and wetter. Winds along the mountaintops are generally westerly and frequently will not reach down into the north-south valleys. Inversions are frequent, and during the fall and winter can persist for many days. Warm Pacific air frequently overrides colder air trapped in the valleys producing severe inversions several thousands of feet deep causing poor pollutant dispersion. This allows small emission sources to produce localized areas of poor air quality because dispersion potential in this region is the lowest in the State.

2.7.5.1 MISSOULA COUNTY

Meteorological monitoring in Missoula was conducted at the Missoula City-County Health Department's CO site at Malfunction Junction (30-063-0005). The meteorological sensors were on a six-foot tripod on top of the monitoring shelter.

Due to the multiple use conditions at the fairgrounds (where the site was located) and safety reasons, it was impossible to install and guy a 10-meter tower at this site. The Department and Missoula County decided to stop met data collection on April 1, 1993, since the data collected with the tripod could not be used for dispersion modeling purposes. The absence of met data at the Malfunction Junction site is not a serious problem since nearly all of the CO NAAQS exceedances in Missoula have occurred under stagnant air conditions.

As part of the hydrogen sulfide (H_2S) at Smurfit-Stone Container meteorological data is collected at the Moccasin Lane site, Stone Container #1A (30-063-0034). The meteorological site utilizes a 10-meter tower and meets all EPA siting requirements.

2.7.5.2 FLATHEAD COUNTY

Meteorological monitoring in Kalispell is conducted at the Shopko CO site (30-029-0048). The meteorological sensors are on a six-foot tripod on top of the monitoring shelter. Data collection began April 1, 2000. Meteorological monitoring is being conducted to provide local met data to characterize the prevailing meteorological conditions during high carbon monoxide concentration episodes.

3.0 NETWORK MODIFICATIONS

As stated in the introduction, the Department must conduct a review to (1) determine if the system (monitoring network) meets the monitoring objectives defined in Appendix D of CFR Part 58, and (2) identify needed modifications of the network, such as the termination or relocation of unnecessary stations or the establishment of new stations which are necessary.

The Department is also required to develop and implement an annual schedule modifying the network in order to eliminate any unnecessary stations or to correct any inadequacies indicated by the results of the annual review. The Department must consult with the Regional Administrator of EPA during the development of the schedule to modify the monitoring program. The final schedule and modifications are subject to the approval of the Regional Administrator.

The regional office of the EPA (Region VIII) established a form and a procedure for documenting and requesting modifications to the network. This form is known as the Network Modification Request Form. The State is required to submit this form in advance requesting EPA approval of any proposed network modification.

Proposed (and accomplished) network modifications for Fiscal Year 2003 (FY03) are listed in Table 8, of Appendix A. Network modifications proposed for Fiscal Year 2004 (FY04) are listed in Table 9, of Appendix A.

4.0 AIR MONITORING EQUIPMENT STATUS

The Department operates various types of equipment to measure pollutants and meteorological parameters at monitoring sites across Montana. The Department also uses shelters, calibrators, other equipment, and devices in support of that monitoring. As the equipment becomes old, it often needs to be upgraded or replaced. When the Department adds sites to its network, new equipment must be purchased. Each year the Department earmarks money to purchase new and replacement equipment.

During Fiscal Year 2003 (FY03) the Department purchased several pieces of equipment. These are listed in Table 5 of Appendix A. In Fiscal Year 2003, the Department spent a total of $173,500 on major air monitoring equipment purchases. This is an unusually large amount, and reflects an aggressive exploitation of circumstances.

In Fiscal Year 2004 (FY04) the Department intends to spend approximately $104,000 for new or replacement equipment (dependant on funding). Table 6 of Appendix A contains a list of the proposed purchases.

Table 7 of Appendix A, is a list of the age of air monitoring equipment that is currently used at State and county operated sites, or will be used at proposed sites. This table also includes equipment used or needed for special projects.

The Department remains committed to upgrading its system, maintaining a high level of equipment dependability, and achieving a high level of data quality and quantity (percent data recovery) by using the best available equipment.

5.0 SUMMARY

5.1 CURRENT NETWORK SUMMARY

Each year the Department is required to develop and implement an annual schedule modifying its air monitoring network in order to eliminate any unnecessary stations or to correct any inadequacies indicated by the results of the annual review. The Department must consult with the Regional Administrator of EPA during the development of the schedule to modify the monitoring program. The final schedule and modifications are subject to the approval of the Regional Administrator.

Table 1 of Appendix A provides a narrative of any changes or modifications to air monitoring stations operated by State and county governments that occurred during Fiscal Year 2002-2003 or are proposed for Fiscal Year 2004. Table 2 of Appendix A provides a listing of current air monitoring stations operated by State and county governments. There are also several sites in these tables that are operated by industry. Company monitors listed in this report are those that reflect significant population exposure.

At the time of this network review, the Department, county agencies, and industrial concerns operated 33 air monitoring stations. Some of the stations collected multiple parameters. There were 16 PM_{10}, 13 $PM_{2.5}$, 8 CO, and 7 SO_2 sites as found in Table 2 of Appendix A.

5.1.1 NETWORK MODIFICATIONS FOR FISCAL YEAR 2003

For Fiscal Year 2003, the Department listed 8 modifications to the network as outlined in Table 8 of Appendix A. A status statement is written below each of the items in the table. We did not perform the hoped for CO saturation study in Helena. We are also still looking for another site in Gallatin County.

5.1.2 NETWORK MODIFICATION GOALS FOR FISCAL YEAR 2004

Table 9 of Appendix A lists the network modification goals for Fiscal Year 2004. The items on this list detail the proposed modifications to the network.

5.2 HISTORICAL MONITORING NETWORK SUMMARY

Appendix C contains a nearly complete listing of all the official sites (e.g. data entry to AIRS) with the monitored parameters that have been established in Montana. The list includes industrial and State sites with the start-up and closing dates. The re-engineering of the AIRS database has made this information much more difficult to extract than it was previously. The table is complete through the end of 2001. It may be possible to bring this table up-to-date next year.

APPENDIX A - TABLES FOR NETWORK REVIEW

TABLE 1

MONTANA AMBIENT AIR MONITORING NETWORK RECENT (FY02-03) AND PROPOSED (FY04) MODIFICATIONS WITH LIST OF PARAMETERS

AIRS Number	Site Name/Address City/County	Parameter	Year of Record	Station Type	Spatial Scale	Monitoring Objective*
	*** H=high concentration, P=high population, S=source impact, B=background**					
30-013-0001	**Overlook Park** **Great Falls/Cascade**	**CO**	**01**	**SLAMS**	**Micro.**	**H,P,S**
	This site at the intersection of 2nd Street and 10th Ave. south replaced the Skyway Conoco site in 2001. Reconstruction of 10th Ave. improved traffic flow to the east reducing CO levels at the old site.					
30-029-0003	**Columbia. Falls Junior High** **Columbia Falls/Flathead**	**PM_{10}**	**85-02**	**SLAMS**	**Neigh.**	**H,P**
	This site was replaced by the Ball Park site at the end of 2002.					
30-029-0007	**Ball Park** **Columbia Falls/Flathead**	**PM_{10}**	**01-**	**SLAMS**	**Neigh.**	**H,P,S**
	This site was created in response to blowing bark dust associated with the operation at Great Northern Bark located across the railroad tracks to the north. The measured values were consistently higher than at the Junior High School site, and this site replaced the Junior High School site at the end of 2002.					
30-029-0009	**Dead End** **Whitefish/Flathead**	**PM_{10}** **$PM_{2.5}$**	**01-** **01-**	**SLAMS** **SLAMS**	**Neigh.** **Neigh.**	**H, P** **H, P**
	The Dead End site replaced the Markus Foods site. It is just off US 93 on the south side of the Whitefish River. Sampling began in October of 2001. The site has a TEOM continuous PM_{10} monitor and two BGI $PM_{2.5}$ samplers.					

TABLE 1 (continued)

MONTANA AMBIENT AIR MONITORING NETWORK RECENT (FY02-03) AND PROPOSED (FY04) MODIFICATIONS WITH LIST OF PARAMETERS

AIRS Number	Site Name/Address City/County	Parameter	Year of Record	Station Type	Spatial Scale	Monitoring Objective*
	*** H=high concentration, P=high population, S=source impact, B=background**					
30-029-0045	**Idaho and Main Kalispell/Flathead**	**CO**	**95-00**	**SLAMS**	**Micro.**	**H,P,S**
	This CO site was located near the intersection of U.S. Highway 93 and U.S. Highway 2 (Idaho Ave & Main St). Valid data collection began in October 1995. Two exceedances (8-hr NAAQS) were recorded in January 1996. A meteorological monitoring system was added to the site in April 1996, and consisted of wind speed, wind direction, and standard deviation of wind direction data. In an effort to expedite traffic movement and reduce emissions, the intersection has been reconstructed. The site was terminated to make way for the construction. It is being reactivated in 2003.					
30-029-0048	**Shopko Kalispell/Flathead**	**CO**	**00-03**	**SPM**	**Micro.**	**H,P,S**
	The Shopko site was established in April 2000 near the intersection of Idaho and Lasalle. It is about 100 yards west of the intersection in front of the Shopko store. It was anticipated to be one of the worst CO locations in Kalispell. Three winters of operation did not reveal a problem, so the equipment will be returned to Idaho and Main.					
30-031-0013	**West Entrance – Park West Yellowstone/Gallatin**	**CO** **$PM_{2.5}$**	**98** **03**	**SPM** **SPM**	**Micro.** **Micro.**	**H,S** **HS**
	This site was established in 1998 to monitor the impact of snowmobiles at the park entrance. Dispersion is poor, and the prospect of a CO exceedance is likely. Fine particulate monitoring is being added for the winter of 2003 to assess the smoke produced by the two-cycle engines.					
30-049-00XX	**Parker Clinic Lincoln/Lewis & Clark**	**$PM_{2.5}$**	**03-**	**SLAMS**	**Neigh.**	**H,P**

Lincoln's particulate problems are related to smoke accumulation during winter inversions. This new site replaced the old 1st Bank site. It began operating in January 2003.

	1st Bank	**PM_{10}**	**98-02**	**SPM**	**Neigh.**	**P**
30-049-0025	**Lincoln/Lewis & Clark**	**$PM_{2.5}$**	**01-02**	**SPM**	**Neigh.**	**P**

This site has problems that came with the need to measure dust. Comparison of fine and coarse particulate, along with the seasonality of high values has made it clear that only $PM_{2.5}$ needs monitoring. A new site on public property and with superior airflow was established during the summer of 2002 at Parker Clinic.

30-049-0024	**Rossiter School**	**PM_{10}**	**96-02**	**SPM**	**Neigh.**	**P**
	Helena/Lewis & Clark					

Problems with servicing this roof -top site have lead to its closure. The samplers were relocated to a ground level site a short distance away at the end of the 2002 calendar year.

30-049-0026	**Rossiter Pump House**	PM_{10}	**03**	**SLAMS**	**Neigh.**	**P**
	Helena/Lewis & Clark					

This site was created to get off the school roof. It was a very short move and the monitored results should be unaffected.

30-053-0018	**Courthouse Annex**	**PM_{10}**	**93-**	**SLAMS**	**Neigh**	**H,P**
	Libby/Lincoln	**$PM_{2.5}$**	**99-**	**SLAMS**	**Neigh.**	**H,P**

A continuous PM_{10} sampler (TEOM) replaced the nephelometer at this site in October 1993. The TEOM is used for the local mandatory residential wood burning curtailment program. $PM_{2.5}$ monitoring was added in January 1999, and collocation of the $PM_{2.5}$ monitoring began in September 1999. $PM_{2.5}$ speciation began in February 2002 and is expected to continue until the high $PM_{2.5}$ values currently being measured are understood. To resolve disparities between TEOM PM_{10} measurements and $PM_{2.5}$ measurements, a Low Volume PM_{10} sampler began operating in October 2002. The TEOM was badly underestimating the PM_{10} and it will be replaced with a BAM during the summer of 2003.

30-063-0024	**Boyd Park**	**PM_{10}**	**84-**	**SLAMS**	**Neigh.**	**H,P**
	Missoula/Missoula	**$PM_{2.5}$**	**99-02**	**SLAMS**	**Neigh.**	**H,P**

Due to results very similar to those at the Health Department site, $PM_{2.5}$ monitoring was terminated in April 2002. The speciation monitor and the TEOM moved to the Health Department. PM_{10} monitoring continues with a BGI Low Volume sampler operating 1 in 6.

TABLE 1 (continued)

MONTANA AMBIENT AIR MONITORING NETWORK RECENT (FY02-03) AND PROPOSED (FY04) MODIFICATIONS WITH LIST OF PARAMETERS

AIRS Number	Site Name/Address City/County	Parameter	Year of Record	Station Type	Spatial Scale	Monitoring Objective*
	*** H=high concentration, P=high population, S=source impact, B=background**					
30-063-0031	**Health Department Roof**	**PM_{10}**	**86-**	**SLAMS**	**Neigh.**	**H,P**
	Missoula/Missoula	**$PM_{2.5}$**	**99-**	**SLAMS**	**Neigh.**	**H,P**
	This site is in the downtown central business district and is considered a maximum concentration site for this part of Missoula. PM_{10} sampling was initiated in September 1986, and became continuous in April 2002 when the TEOM was moved from the Boyd Park site. $PM_{2.5}$ sampling began in February 1999. In April 2002 the site was collocated for $PM_{2.5}$ and Speciation was added.					
30-063-0012	**Lion's Park**	**$PM_{2.5}$**	**02-**	**SPM**	**Neigh.**	**P**
	Milltown/Missoula					
	This site was installed to monitor fine particulate on the up-slope side of Hell Gate from Missoula.					
30-081-0006	**USFS**	**PM_{10}**	**01-**	**SPM**	**Neigh.**	**P**
	Stevensville/Ravalli					
	Replaced the old Ranger Station site. Relocated about 100 yards. The move was necessary because of construction.					
30-111-0082	**Bridal Shop**	**CO**	**97-**	**SPM**	**Micro.**	**H,P,S**
	Billings/Yellowstone	**SO_2**	**01-**	**SPM**	**Neigh.**	**H,P**
	The Bridal Shop site replaced the Norwest Bank site as the maximum CO site in the downtown Billings area in 1997. Sulfur dioxide monitoring was added in 2002 to evaluate SO_2 exposure in downtown Billings.					
30-111-XXXX	**Bear Tooth School**	**SO_2**	**03**	**SPM**	**Neigh.**	**H,P,S**
	Billings/Yellowstone					
	This new site is being established in the "heights" to evaluate pollutant impact from the refineries lower in the valley.					

30-111-0083	**Lower Coburn Road Billings/Yellowstone**	**SO_2**	**99-03**	**SLAMS**	**Neigh.**	**H,S**

Dispersion models suggested that this site might see relatively high concentrations with high frequency. The site was intended to encounter the annual average maximum. It began operation in August 1999. Three years of monitoring revealed that the site was rarely impacted by sources, so it will be discontinued in 2003.

30-111-1079	**Mount Olive**	**CO**	**01-**	**SLAMS**	**Micro.**	**H,P,S**
	Billings/Yellowstone	**SO_2**	**01-**	**SLAMS**	**Neigh.**	**H,P**

This site previously closed in 1997, was reopened in response to continued growth on the west side of Billings. It monitors CO at what is probably the busiest intersection in the city and provides an indication of SO2 exposure on the west side of the city.

TABLE 2

EXISTING MONTANA AMBIENT AIR MONITORING NETWORK WITH LIST OF PARAMETERS

AIRS Number	Site Name/Address City/County	Parameter	Year of Record	Station Type	Spatial Scale	Monitoring Objective*
* H=high concentration, P=high population, S=source impact, B=background						
30-013-0001	Overlook Park Great Falls/Cascade	CO	01-	SLAMS	Micro.	H,P,S
30-013-1026	Great Falls High School Great Falls/Cascade	$PM_{2.5}$	00-	SLAMS	Neigh.	H,P
30-029-0009	Dead End Whitefish/Flathead	PM_{10}	01-	SLAMS	Neigh.	H,P
		$PM_{2.5}$	01-	SLAMS	Neigh.	H,
30-029-0007	Ball Park Columbia Falls/Flathead	PM_{10}	01-	SLAMS	Neigh.	H,P,S
30-029-0047	Flathead Electric Kalispell/Flathead	CO	99-	SPM	Neigh.	P
		PM_{10}	99-	SLAMS	Neigh.	H,P
		$PM_{2.5}$	99-	SLAMS	Neigh.	H,P
30-029-0048	Shopko Kalispell/Flathead	CO	00-03	SPM	Micro.	H,P,S
30-031-0008	Belgrade ConAgra Belgrade/Gallatin	PM_{10}	91-	SLAMS	Neigh.	H,P
		$PM_{2.5}$	00-	SPM	Neigh.	H,P
30-031-0012	Firehole West Yellowstone/Gallatin	PM_{10}	95-	SPM	Neigh.	H,P
30-031-0013	West Entrance – Park West Yellowstone/Gallatin	CO	98-	SPM	Micro.	H,S
30-049-0018	Lincoln School	PM_{10}	91-	SLAMS	Neigh.	H,P

TABLE 2 (continued)

EXISTING MONTANA AMBIENT AIR MONITORING NETWORK WITH LIST OF PARAMETERS

AIRS Number	Site Name/Address City/County	Parameter	Year of Record	Station Type	Spatial Scale	Monitoring Objective*
* H=high concentration, P=high population, S=source impact, B=background						
	Helena/Lewis & Clark	$PM_{2.5}$	99-	SLAMS	Neigh.	H,P
30-049-0026	Rossiter Pump House Helena/Lewis & Clark	PM_{10}	96-	SLAMS	Neigh.	P
30-049-0019	Parker Clinic Lincoln/Lewis & Clark	$PM_{2.5}$	03-	SLAMS	Neigh.	P
30-053-0018	Courthouse Annex Libby/Lincoln	PM_{10} $PM_{2.5}$	93- 99-	SLAMS SLAMS	Neigh Neigh	H,P H,P
30-063-0005	Malfunction Junction Missoula/Missoula	CO	79-	SLAMS	Neigh.	H,P,S
30-063-0012	Lion's Park Milltown/Missoula	$PM_{2.5}$	02	SPM	Neigh.	H,P,S
30-063-0016	Stone #2 Missoula/Missoula	PM_{10}	92-	SPM	Neigh.	S
30-063-0024	Boyd Park Missoula/Missoula	PM_{10}	84-	SLAMS	Neigh.	H,P
30-063-0031	Health Department Roof Missoula/Missoula	PM_{10} $PM_{2.5}$	86- 99-	SLAMS SLAMS	Neigh. Neigh.	H,P H,P
30-063-0034	Stone #1A	PM_{10}	92-	SPM	Neigh.	S

	Missoula/Missoula					
30-081-0001	**Hamilton Courthouse**	**PM_{10}**	**99-**	**SLAMS**	**Neigh.**	**H,P**
	Hamilton/Ravalli	**$PM_{2.5}$**	**00-**	**SLAMS**	**Neigh.**	**H,P**
30-081-0006	**Stevensville Ranger Station**	**PM_{10}**	**01-**	**SPM**	**Neigh.**	**P**
	Stevensville/Ravalli					
30-089-0007	**Thompson Falls High School**	**PM_{10}**	**99-**	**SLAMS**	**Neigh.**	**H,P**
	Thompson Falls/Sanders	**$PM_{2.5}$**	**00-**	**SLAMS**	**Neigh.**	**H,P**
30-093-0005	**Greeley School**	**PM_{10}**	**85-**	**SLAMS**	**Neigh.**	**H,P,S**
	Butte/Silver Bow	**$PM_{2.5}$**	**99-**	**SLAMS**	**Neigh.**	**H,P**
30-093-0053	**Storm Sewer**	**CO**	**98-**	**SPM**	**Micro.**	**H,P,S**
	Butte/Silver Bow					
30-111-0016	**Laurel Farm**	**SO_2**	**87-**	**SPM**	**Neigh.**	**H,S**
	Laurel/Yellowstone					
30-111-0066	**Coburn Road**	**SO_2**	**81-**	**SLAMS**	**Neigh.**	**H,S**
	Billings/Yellowstone					
30-111-0079	**Mount Olive**	**CO**	**01-**	**SLAMS**	**Micro.**	**H,P,S**
	Billings/Yellowstone	**SO_2**	**01-**	**SLAMS**	**Neigh.**	**P**
30-111-0082	**Bridal Shop**	**CO**	**98-**	**SPM**	**Micro.**	**H,P,S**
	Billings/Yellowstone	**SO_2**	**01-**	**SPM**	**Neigh.**	**P**
30-111-0083	**Lower Coburn Road**	**SO_2**	**99-**	**SLAMS**	**Neigh.**	**H,S**
	Billings/Yellowstone					
30-111-1065	**Lockwood Park**	**SO_2**	**87-**	**SPM**	**Neigh.**	**H,P,S**
	Billings/Yellowstone	**PM_{10}**	**96-**	**SPM**	**Neigh.**	**H,P**
		$PM_{2.5}$	**99-**	**SLAMS**	**Neigh.**	**H,P**
30-111-2005	**Brickyard Lane**	**SO_2**	**89-**	**SPM**	**Neigh.**	**H,P,S**
	Billings/Yellowstone					
30-111-2006	**Johnson Lane**	**SO_2**	**93-**	**SPM**	**Neigh.**	**H,P,S**

TABLE 2 (continued)

EXISTING MONTANA AMBIENT AIR MONITORING NETWORK WITH LIST OF PARAMETERS

AIRS Number	Site Name/Address City/County	Parameter	Year of Record	Station Type	Spatial Scale	Monitoring Objective*
* H=high concentration, P=high population, S=source impact, B=background						
	Billings/Yellowstone					
30-111-2007	Pine Hills Billings/Yellowstone	SO_2	93-	SPM	Neigh.	H,P,S

TABLE 3

2002 PM_{10} SAMPLING FREQUENCY WAIVER STATISTICS

AIRS Number	Site Name/Address City/County Station Type	Sample Year	# Of Valid Samples	99% Number	99% (ug/M3)	Mean	Standard Deviation	*t – stat* Value
30-031-0008	Belgrade ConAgra	2000	90	90	65			
	Belgrade/Gallatin	2001	85	85	75			
	SLAMS	2002	81	81	53	64	7.07	-12.82
30-031-0012	Firehole	2000	89	89	46			
	West Yellowstone/Gallatin	2001	87	87	66			
	SPM	2002	74	74	38	50	14.14	-7.425
30-049-0026 [1]	Helena - Rossiter Pump House	2000	54	54	50			
	Helena/Lewis & Clark	2001	55	55	52			
	SLAMS	2002	57	57	41	48	1.414	-75.90
30-063-0024 [2]	Boyd Park	2000	303	300	39			
	Missoula/Missoula	2001	365	362	63			
	SLAMS	2002	134	133	45	49	12.49	-8.487
30-081-0001	Hamilton County Courthouse	2000	75	75	68			
	Hamilton/Ravalli	2001	71	71	74			
	SLAMS	2002	60	60	85	76	4.243	-18.70
30-089-0007	Thompson Falls High School	2000	91	91	80			
	Thompson Falls/Sanders	2001	77	77	51			
	SLAMS	2002	89	89	69	67	20.51	-4.308
30-111-1065	Lockwood Park	2000	89	89	43			
	Billings/Yellowstone	2001	57	57	32			
	SPM	2002	57	57	27	34	7.778	-15.56

[1]Data from old site on School House roof.
[2]Data prior to April 2002 is from TEOM (method 079).

TABLE 4
PM_{10} NETWORK SAMPLING FREQUENCIES

AIRS Number	Site Name/Address City/County Station Type/Parameter	Current 1ST/4TH Quarters	Current 2nd/3rd Quarters	Proposed 1ST/4TH Quarters	Proposed 2nd/3rd Quarters
30-029-0007	Ball Park Columbia Falls/Flathead **SLAMS / PM_{10}**	1-in-3		No Change	
30-029-0009	Dead End Whitefish/Flathead **SLAMS / PM_{10}**	TEOM		No Change	
30-029-0047	Flathead Electric Coop. Kalispell/Flathead **SLAMS / PM_{10}**	TEOM		No Change	
30-031-0008	Belgrade ConAgra Belgrade/Gallatin **SLAMS / PM_{10}***	1-in-3	1-in-6	No Change	
30-031-0012	Firehole West Yellowstone/Gallatin **SPM / PM_{10}**	1-in-3	1-in-6	No Change	
30-049-0018	Lincoln School Helena/Lewis & Clark **SLAMS / PM_{10}^{++}**	TEOM and 1-in-6		No Change	
30-049-0026	Helena – Rossiter Pump House Helena/Lewis & Clark **SLAMS / PM_{10}**	1-in-6 Began sampling 1/3/03		1-in-6	
30-053-0018	Courthouse Annex Libby/Lincoln **SLAMS / PM_{10}**	TEOM (Replace with BAM) and 1-in-6		No Change	

TABLE 4 (Continued)

PM_{10} NETWORK SAMPLING FREQUENCIES

AIRS Number	Site Name/Address City/County Station Type/Parameter	Current		Proposed	
		$1^{ST}/4^{TH}$ Quarters	$2^{nd}/3^{rd}$ Quarters	$1^{ST}/4^{TH}$ Quarters	$2^{nd}/3^{rd}$ Quarters
30-063-0024	Boyd Park Missoula/Missoula **SLAMS / PM_{10}**		1-in-6		No Change
30-063-0031	Health Department Roof Missoula/Missoula **SPM / PM_{10}**		TEOM		No Change
30-081-0001	Hamilton County Courthouse Hamilton/Ravalli **SLAMS / PM_{10}**	1-in-3	1-in-6		No Change
30-081-0006	USFS Stevensville/Ravalli **SPM / PM_{10}**		TEOM		No Change
30-089-0007	Thompson Falls High School Thompson Falls/Sanders **SLAMS / PM_{10}**	1-in-3	1-in-6		No Change
30-093-0005	Greeley School Butte/Silver Bow **SLAMS / PM_{10}**		TEOM		No Change
30-111-1065	Lockwood Park Billings/Yellowstone **SPM / PM_{10}**		1-in-6		No Change

TABLE 5

MONTANA MAJOR EQUIPMENT PURCHASES FOR FY03

Quantity	Item Description	Each (est)	Total (est)
2	CO Analyzer	10,000	20,000
2	SO_2 Analyzer	10,000	20,000
1	$PM_{2.5}$ Samplers	7,500	7,500
32	Cyclones for $PM_{2.5}$ Samplers	900	29,000
2	Mass Flow Meter Nests	3,500	7,000
7	ESC Data Loggers	6,000	42,000
1	Dilution Calibrator and Zero Air Source	10,000	10,000
2	Beta Attenuation Monitors	15,000	30,000
1	SASS speciation sampler pump house	8,000	8,000
	Total Equipment Purchases		**$173,500**

TABLE 6

MONTANA MAJOR PLANNED EQUIPMENT PURCHASES FOR FY04

Quantity	Item Description	Each (est)	Total (est)
4	Beta Attenuation Monitors	15,000	60,000
3	$PM_{2.5}$ Samplers	7,500	22,500
2	NOx Monitors	11,000	22,000
	Total of Planned Equipment Purchases		**$104,500**

TABLE 7

AGE OF EQUIPMENT

Equipment	Sites	Minimum Number Required	Comments	Year of Purchase '94	'95	'96	'97	'98	'99	'00	'01	'02	'03
CO Analyzers	8	9			5			2	1		1	2	2
SO_2 Analyzers	4	5						1	1	1	1	2	2
PM_{10} Continuous	6	7		1	2						2		2
PM_{10} Hi-Vol	7	15	Two samplers required at most sites. 3 and 4 required at some collocated sites										
$PM_{2.5}$ Samplers	14	30	Two samplers at 10 sites. Three at two collocated sites. One sampler at two PM_{10} sites.					16	4	7		4	1
Wind Systems	7	8							2		6		
Dilution Calibrators	10	11	Two required for audits.		4			2		1			1
Strip Chart Recorders	17	17					1		3		5		
Dataloggers	15	16							5	6			7
Shelters	14	14			3		1	2					

TABLE 8

MONTANA NETWORK MODIFICATIONS FOR FY03

Rank	AIRS Number	Site Name/Address City/County	Parameter	**********Comments**********
1.	30-049-0024	Rossiter School Helena/Lewis & Clark	PM_{10}	Relocate a short distance to get off the roof and down to a more easily serviced site.
	Status:	**Accomplished January 2003**		
2.	30-049-0025	First Bank Lincoln/Lewis & Clark	PM_{10} $PM_{2.5}$	Terminate at end of 2002, and replace with a new $PM_{2.5}$ site on public property in town of Lincoln.
	Status:	**Accomplished January 2003**		
3.	30-053-0018	Courthouse Annex Libby/Lincoln	PM_{10}	Collocate TEOM with a BGI (LoVol) PM10 from Oct. through March.
	Status:	**Started 10/02 - Continues**		
4.	30-029-0003	Jr. High School Columbia Falls/Flathead	PM_{10}	Terminate at end of 2002.
	Status:	**Accomplished**		
5.	30-063-0012	Bonner Area Bonner/Missoula	$PM_{2.5}$	Short term study of fine particulate levels in the Clark Fork Valley upstream of Missoula and Hell Gate.
	Status:	**Began August 2002**		

TABLE 9

MONTANA NETWORK MODIFICATION GOALS FOR FY04

Rank	AIRS Number	Site Name/Address City/County	Parameter	**********Comments**********
1.	30-029-00XX	Idaho and Main Kalispell/Flathead	CO	Return Shopko shelter to Idaho and Main to evaluate effect of intersection reconstruction.
2.	30-053-0018	Courthouse Annex Libby/Lincoln	PM_{10}	Replace TEOM with a BAM. Continue to operate BGI (LoVol) PM10. Continue $PM_{2.5}$ speciation. Conduct study to determine site's area of representation and the extent of fine particulate problem.
3.	30-111-0084	Beartooth School Billings/Yellowstone	SO_2	Terminate Lower Coburn Road and move to a Site in the "heights".
4.	30-031-0013	West Entrance-Park West Yellowstone/Gallatin	CO $PM_{2.5}$	Add continuous $PM_{2.5}$ monitoring and collocate with FRM sampler.
5.	30-063-0012	Lion's Park Milltown/Missoula	$PM_{2.5}$	Continue study of fine particulate levels in the Clark Fork Valley upstream of Missoula and Hell Gate.
6.	30-031-XXXX	Belgrade Belgrade/Gallatin	$PM_{2.5}$	Find and evaluate a fine particulate site in the Gallatin River Valley closer to Bozeman than the Conagra site.
7.	30-049-XXXX	Helena/Lewis and Clark	CO	Conduct a CO saturation study to identify maximum concentration area and determine need for monitoring.

APPENDIX B - EMISSION INVENTORY DATA FOR 2002

This appendix presents emission inventory data for the calendar year from the major point sources throughout Montana.

TABLE 1- REPORTED EMISSIONS FROM MAJOR SOURCES FOR 2002

Beaverhead County

SOURCE NUMBER	SOURCE NAME	CO	NO2	PM10	TOTAL PARTICULATE	SO2	VOC
001-0002	BARRETTS MILL	6.3	22.5	18.0	21.4	0.5	1.0

Big Horn County

SOURCE NUMBER	SOURCE NAME	CO	NO2	PM10	TOTAL PARTICULATE	SO2	VOC
003-0003	SPRING CREEK MINE	287.7	263.3	224.4	880.6	28.9	15.6
003-0004	DECKER MINE	420.6	474.8	599.0	2355.6	51.7	30.2
003-0006	SCHOOL HOUSE	22.7	15.1	0.3	0.3	0.0	7.5
003-0007	CX24 BATTERY	19.8	13.5	0.2	0.2	0.0	6.8
003-0008	CX25 BATTERY	21.4	15.1	0.3	0.3	0.0	7.5
003-0009	SQUIRREL CREEK	21.3	14.3	0.3	0.3	0.0	7.5
003-0010	STATE LINE	32.2	21.5	0.4	0.4	0.0	11.1
003-0011	CX-19 BATTERY	11.0	7.4	0.1	0.1	0.0	3.7
003-0012	SHELL 33 BATTERY	6.8	4.5	0.1	0.1	0.0	2.3
003-0015	CX-35 BATTERY	22.4	14.8	0.3	0.3	0.0	7.4
003-0016	CONNOR 33	28.4	18.8	0.4	0.4	0.0	9.4
003-0017	CX-14 BATTERY	17.6	11.7	0.2	0.2	0.0	5.9
TOTAL		911.9	874.9	826.0	3238.7	80.7	114.8

Blaine County

SOURCE NUMBER	SOURCE NAME	CO	NO2	PM10	TOTAL PARTICULATE	SO2	VOC
005-0008	LODGE CREEK PIPELINE - BLAINE COUNTY	0.0	0.0	0.0	0.0	0.0	0.0
005-0009	BATTLE CREEK COMPRESSOR STATION - BLAINE COUNTY	24.8	14.2	1.1	1.1	0.6	14.8
005-0010	OCEAN ENERGY INC - BLAINE COUNTY #4	32.9	15.2	0.0	0.0	0.0	10.9
005-0011	HAVRE PIPELINE COMPANY - LODGE CREEK COMP. STATION	3.1	0.2	0.2	0.2	0.0	0.5
005-0012	HAVRE PIPELINE COMPANY - WILLIAMS COMP. STATION	1.1	0.1	0.1	0.1	0.0	0.4
005-0013	HAVRE PIPELINE COMPANY - BLAINE COUNTY #5	4.8	3.3	0.2	0.2	0.0	6.4
TOTAL		66.7	32.9	1.6	1.6	0.7	32.9

Carbon County

SOURCE NUMBER	SOURCE NAME	CO	NO2	PM10	TOTAL PARTICULATE	SO2	VOC
009-0001	MONTANA LIMESTONE CO - MILL	0.0	0.0	4.9	6.5	0.0	0.0
009-0002	DRY CREEK FIELD STATION 056	13.4	77.1	0.5	0.5	0.0	8.3
009-0003	MONTANA LIMESTONE CO - QUARRY	9.4	21.9	17.3	34.0	2.4	1.6
TOTAL		22.8	99.0	22.7	41.1	2.4	9.9

Cascade County

SOURCE NUMBER	SOURCE NAME	CO	NO2	PM10	TOTAL PARTICULATE	SO2	VOC
013-0013	CEREAL FOOD - 013-0013	0.3	1.1	25.8	84.8	0.0	0.0
013-0015	LAND O'LAKES/HARVEST STATES FEEDS	0.2	1.0	0.9	7.7	0.0	0.1
013-0016	MALMSTROM AFB	18.4	47.6	1.7	2.4	12.0	0.7
013-0020	GREAT FALLS REDI MIX	0.6	0.4	14.7	32.2	0.3	0.3
013-0022	GREAT FALLS TERMINAL	0.0	0.0	0.0	0.0	0.0	139.1
013-0023	MONTANA AIR NATIONAL GUARD	6.8	6.8	0.3	0.3	0.4	0.8
013-0024	THOMPSON EXCAVATING - 2903	0.0	0.0	0.2	0.4	0.0	0.0
013-0026	AGRI TECHNOLOGY CORP	0.0	0.0	0.0	0.0	0.0	0.0
013-0027	MONTANA SPECIALTY MILLS LLC	0.1	0.6	37.5	63.8	0.0	0.0
013-0028	THOMPSON EXCAVATING - 2826	0.0	0.0	1.5	3.3	0.0	0.0
013-0030	HIGH PLAINS SANT LNDFLL/MT WASTE SYSTEMS	0.0	0.0	0.6	2.7	0.0	0.0
013-0031	HUMANE SOCIETY OF CASCADE COUNTY	0.0	0.0	0.1	0.1	0.1	0.0
013-0032	CROXFORD & SONS FUNERAL HOME & CREMATORY	0.0	0.0	0.0	0.1	0.1	0.0
013-0034	OILY WASTE PROCESSORS	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL		26.3	57.5	83.3	197.9	12.9	141.0

Custer County

SOURCE NUMBER	SOURCE NAME	CO	NO2	PM10	TOTAL PARTICULATE	SO2	VOC
017-0001	WILLISTON BASIN - HATHAWAY STATION	2.7	41.9	1.8	1.8	0.0	0.3
017-0002	MDU - MILES CITY	1.5	6.1	0.6	0.6	0.2	0.0
017-0004	TRINITY INDUSTRIES, INC.	0.0	0.0	3.9	8.1	0.0	4.9
017-0005	PHILIP SERVICES CORP. - INDUSTRIAL SERVICES GROUP	2.0	1.0	0.1	0.1	0.0	2.3
TOTAL		6.2	48.9	6.3	10.5	0.2	7.5

Dawson County

SOURCE NUMBER	SOURCE NAME	CO	NO2	PM10	TOTAL PARTICULATE	SO2	VOC
021-0003	GLENDIVE	0.0	0.0	0.0	0.0	0.0	16.6
021-0004	WILLISTON BASIN - MORGAN CREEK	28.9	19.3	0.3	0.3	0.0	9.6
021-0005	MDU - GLENDIVE	2.9	11.8	1.1	1.1	0.2	0.0
021-0006	SHELL PIPELINE - RICHEY STATION	0.0	0.0	0.0	0.0	0.0	1.0
021-0009	FARMERS ELEVATOR	0.0	0.0	6.4	22.2	0.0	0.0
TOTAL		31.8	31.0	7.8	23.6	0.2	27.2

Fallon County

SOURCE NUMBER	SOURCE NAME	CO	NO2	PM10	TOTAL PARTICULATE	SO2	VOC
025-0001	BAKER PLANT	9.7	13.7	0.8	0.8	3.1	12.6
025-0002	WILLISTON BASIN - LITTLE BEAVER	238.7	365.9	0.8	0.8	0.0	14.3
025-0003	WILLISTON BASIN - CABIN CREEK	377.7	509.2	12.6	12.6	0.2	127.0
025-0006	BAKER STATION - 025-0006	0.0	0.0	0.0	0.0	0.0	15.8
025-0008	WILLISTON BASIN - MONARCH STATION	69.8	46.9	0.8	0.8	0.1	54.6
025-0010	WILLISTON BASIN - BAKER COMPRESSOR STA	78.1	114.7	0.3	0.3	0.0	21.9
025-0011	N COMPRESSOR STATION	0.5	0.6	0.2	0.2	0.7	3.2
TOTAL		774.5	1051.0	15.5	15.5	4.1	249.4

Fergus County

SOURCE NUMBER	SOURCE NAME	CO	NO2	PM10	TOTAL PARTICULATE	SO2	VOC
027-0005	KENDALL MINE	2.2	1.0	2.1	5.6	0.1	0.0
027-0006	MOUNTAIN MEADOWS PET PRODUCTS	0.0	0.2	6.3	8.8	0.0	0.0
027-0007	CENTRAL MONTANA CREMATORIUM	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL		2.2	1.2	8.4	14.4	0.1	0.0

Flathead County

SOURCE NUMBER	SOURCE NAME	CO	NO2	PM10	TOTAL PARTICULATE	SO2	VOC
029-0006	KLINGLER LUMBER	0.0	0.0	2.3	5.3	0.0	0.0
029-0008	PLUM CREEK MANUFACTURING LP COLMB FLS	1785.1	1051.6	285.5	390.7	20.6	553.4
029-0010	F.H. STOLTZE LAND AND LUMBER CO	112.9	5.6	58.0	88.3	0.6	20.0
029-0012	COLUMBIA FALLS ALUMINUM	13033.0	7.2	237.5	605.1	588.3	138.5
029-0016	PACK & CO	4.3	0.3	8.0	12.6	2.5	2.0
029-0019	STILLWATER FOREST PRODUCTS	0.0	0.0	4.4	10.8	0.0	0.0
029-0024	A-1 PAVING - 029-0024	3.9	2.1	7.4	11.9	8.6	10.9
029-0025	MCELROY AND WILKEN	0.0	0.0	5.7	10.7	0.0	0.0
029-0026	PARTNERS IN WOOD	0.0	0.0	0.0	0.0	0.0	0.0
029-0028	MOUNTAIN VIEW PET CREMATORY	0.0	0.0	0.0	0.0	0.0	0.0
029-0029	FLATHEAD COUNTY SOLID WASTE DISTRICT	10.9	4.4	39.0	161.6	0.0	0.1
029-0030	JOHNSON MORTUARY	0.0	0.0	0.0	0.0	0.0	0.0
029-0031	GREAT NORTHERN BARK - 3027	0.1	0.3	34.6	92.6	0.0	0.0
029-0032	HILLSIDE CREMATORY	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL		14950.3	1071.7	682.6	1389.7	620.7	724.9

Gallatin County

SOURCE NUMBER	SOURCE NAME	CO	NO2	PM10	TOTAL PARTICULATE	SO2	VOC
031-0005	HOLCIM (US)	46.9	1502.6	228.7	344.0	284.5	1.9
031-0006	LUZENAC AMERICA - THREE FORKS PLANT	3.9	9.6	24.9	54.0	0.2	9.0
031-0007	KANTA PRODUCTS	0.2	0.4	4.0	8.8	0.0	0.0
031-0008	SAPPINGTON MILL	0.9	3.0	9.4	16.2	0.1	0.1
031-0009	EXXONMOBIL - BOZEMAN MARKETING TERMINAL	0.0	0.0	0.0	0.0	0.0	6.7
031-0010	MSU - CENTRAL HEATING PLANT	13.9	28.7	1.3	1.3	0.1	0.9
031-0011	MT DOL VETERINARY DIAGNOSTIC LAB	0.0	0.0	0.1	0.1	0.0	0.0
031-0012	BOZEMAN PRODUCT TERMINAL	0.0	0.0	0.0	0.0	0.0	74.4
031-0013	CITY OF BOZEMAN SANITARY LANDFILL	22.9	1.2	3.7	15.3	1.0	1.1
031-0014	DOKKEN-NELSON FUNERAL SERVICE	0.0	0.0	0.0	0.0	0.0	0.0
031-0015	BIG SKY INSULATION INC	0.3	0.3	0.0	0.0	0.0	27.2
TOTAL		89.1	1545.9	272.2	439.6	286.1	121.3

Glacier County

SOURCE NUMBER	SOURCE NAME	CO	NO2	PM10	TOTAL PARTICULATE	SO2	VOC
035-0005	CUT BANK CRUDE OIL PIPELINE	0.0	0.0	0.0	0.0	0.0	17.7
035-0006	CUT BANK FIELD STATION 015	14.3	20.6	0.2	0.2	0.0	0.3
035-0007	CUT BANK FIELD STATION 002	1.0	1.8	0.0	0.0	0.0	0.0
035-0008	CUT BANK FIELD STATION 025	24.5	35.6	0.3	0.3	0.0	0.5
035-0009	COBB STORAGE FIELD STATION 017	6.5	11.0	1.0	1.0	0.0	3.4
035-0010	CUT BANK FIELD STATION 001	18.5	26.8	0.2	0.2	0.0	0.3
035-0011	CUT BANK FIELD STATION 018	3.1	25.2	0.1	0.1	0.0	0.2
035-0012	GYPSY HIGHVIEW-RED RIVER STATION	12.0	5.5	0.0	0.0	0.0	0.2
035-0013	BLACKFEET SHALLOW GAS SYSTEMS	2.0	7.9	0.0	0.0	0.0	0.3
035-0014	BIG SKY PIPELINE	0.0	0.0	0.0	0.0	0.0	3.7
035-0016	LITTLE ROCK COMPRESSOR STATION	7.5	10.1	0.0	0.0	0.0	0.2
TOTAL		89.3	144.6	1.9	1.9	0.1	26.9

Golden Valley County

SOURCE NUMBER	SOURCE NAME	CO	NO2	PM10	TOTAL PARTICULATE	SO2	VOC
037-0001	BIG COULEE FIELD STATION 057	34.6	50.3	0.4	0.4	0.0	0.7

Granite County

SOURCE NUMBER	SOURCE NAME	CO	NO2	PM10	TOTAL PARTICULATE	SO2	VOC
039-0001	BLACK PINE MINE	0.0	0.0	0.0	0.0	0.0	0.0
039-0002	CONTACT MINING CO	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL		0.0	0.0	0.0	0.0	0.0	0.0

Hill County

SOURCE NUMBER	SOURCE NAME	CO	NO2	PM10	TOTAL PARTICULATE	SO2	VOC
041-0003	BOX ELDER FIELD STATION 070	0.7	4.9	0.0	0.0	0.0	0.2
041-0004	OCEAN ENERGY HPC - HILL COUNTY #2	3.8	8.5	0.0	0.0	0.0	2.1
041-0005	OCEAN ENERGY INC. - HILL COUNTY #3	27.6	12.5	0.8	0.8	0.0	10.2
041-0006	LODGE CREEK PIPELINES, LLC - WILLOW CREEK COMPRESSOI	0.0	0.0	0.0	0.0	0.0	0.0
041-0007	HAVRE PIPELINE COMPANY - EAST END COLONY STATION	7.4	10.9	0.0	0.0	0.0	7.0
041-0008	NORTH PLAINS CREMATORY	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL		39.5	36.9	0.8	0.8	0.1	19.5

Jefferson County

SOURCE NUMBER	SOURCE NAME	CO	NO2	PM10	TOTAL PARTICULATE	SO2	VOC
043-0002	GOLDEN SUNLIGHT MINE	107.3	155.5	260.3	546.9	16.8	10.4
043-0003	MONTANA TUNNELS MINE	309.1	475.5	641.7	1374.1	51.8	32.6
TOTAL		416.5	631.0	902.0	1921.1	68.6	43.0

Judith County

SOURCE NUMBER	SOURCE NAME	CO	NO2	PM10	TOTAL PARTICULATE	SO2	VOC
045-0001	UNITED HARVEST - MOCCASIN	0.0	0.0	2.8	7.9	0.0	0.0

Lake County

SOURCE NUMBER	SOURCE NAME	CO	NO2	PM10	TOTAL PARTICULATE	SO2	VOC
047-0003	HOG HEAVEN MINE	0.0	0.0	0.0	0.0	0.0	0.0

Lewis and Clarke County

SOURCE NUMBER	SOURCE NAME	CO	NO2	PM10	TOTAL PARTICULATE	SO2	VOC
049-0003	AMERICAN CHEMET	5.1	5.6	5.7	5.7	0.0	0.3
049-0005	HELENA SAND & GRAVEL	2.4	5.7	21.3	32.7	14.0	18.9
049-0009	LEWIS & CLARK HUMANE SOCIETY	0.0	0.0	0.0	0.0	0.0	0.0
049-0010	EXXONMOBIL - HELENA MARKETING TERMINAL	0.0	0.0	0.0	0.0	0.0	9.0
049-0011	HELENA PRODUCT TERMINAL	0.0	0.0	0.0	0.0	0.0	123.6
049-0013	AUGUSTA MAIN LINE #3 (STA 051)	12.0	15.0	0.4	0.4	0.0	7.3
049-0014	CITY OF HELENA LANDFILL	0.0	0.0	0.0	0.0	0.0	0.1
049-0015	MAINLINE #4	0.0	0.0	0.0	0.0	0.0	0.0
049-0016	HELENA VALLEY PET CREMATIONS	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL		19.5	26.4	27.5	38.9	14.1	159.2

Liberty County

SOURCE NUMBER	SOURCE NAME	CO	NO2	PM10	TOTAL PARTICULATE	SO2	VOC
051-0002	UTOPIA FIELD STATION 035	8.5	39.3	0.2	0.2	0.0	3.6
051-0003	MCW TRANSMISSION LP	5.6	14.2	0.3	0.3	0.0	1.0
TOTAL		14.1	53.5	0.6	0.6	0.0	4.6

Lincoln County

SOURCE NUMBER	SOURCE NAME	CO	NO2	PM10	TOTAL PARTICULATE	SO2	VOC
053-0002	PLUM CREEK MFG LP - FORTINE	129.2	14.3	48.1	81.9	1.9	52.4
053-0003	TROY MINE	0.7	1.7	4.4	8.7	0.2	0.1
053-0004	STIMSON LUMBER - LIBBY	1311.5	50.5	27.1	56.8	4.6	87.0
053-0010	EUREKA PELLET MILLS	10.1	2.5	31.9	46.5	0.4	3.5
053-0014	LONE PINE TIMBER INDUSTRIES	0.0	0.0	15.1	31.6	0.0	0.0
TOTAL		1451.6	69.0	126.6	225.5	7.1	143.0

Mc Cone County

SOURCE NUMBER	SOURCE NAME	CO	NO2	PM10	TOTAL PARTICULATE	SO2	VOC
055-0001	WILLISTON BASIN - VIDA STATION	41.7	178.9	0.5	0.5	0.0	12.6

Madison County

SOURCE NUMBER	SOURCE NAME	CO	NO2	PM10	TOTAL PARTICULATE	SO2	VOC
057-0001	YELLOWSTONE MINE	35.0	40.2	38.5	84.1	4.4	2.5
057-0011	MONTANA OREGON INVESTMENT GROUP LLC	1.9	2.8	1.0	2.1	0.3	0.2
057-0012	TREASURE MINE	11.0	10.8	9.3	20.2	1.2	0.7
057-0013	REGAL MINE	32.5	32.2	42.3	97.0	3.5	2.2
TOTAL		80.4	86.1	91.1	203.4	9.4	5.5

Meagher County

SOURCE NUMBER	SOURCE NAME	CO	NO2	PM10	TOTAL PARTICULATE	SO2	VOC
059-0002	BIG SKY CREMATIONS	0.0	0.0	0.0	0.0	0.0	0.0

Mineral County

SOURCE NUMBER	SOURCE NAME	CO	NO2	PM10	TOTAL PARTICULATE	SO2	VOC
061-0001	SUPERIOR ENTERPRISES	0.0	0.0	0.0	0.0	0.0	0.0
061-0004	TRICON TIMBER INC	28.0	19.6	22.7	44.1	1.1	9.8
061-0005	MOUNTAIN WEST LLC	0.0	0.0	16.9	46.4	0.0	0.0
061-0006	EUREKA PELLET MILLS - SUPERIOR	1.3	10.9	18.1	36.9	35.4	2.2
TOTAL		29.3	30.5	57.7	127.4	36.4	12.0

Missoula County

SOURCE NUMBER	SOURCE NAME	CO	NO2	PM10	TOTAL PARTICULATE	SO2	VOC
063-0002	ROSEBURG FOREST PRODUCTS	92.4	515.8	205.6	206.7	7.8	142.1
063-0004	PYRAMID MTN LUMBER	21.2	3.7	90.3	161.3	0.5	44.4
063-0006	STONE CONTAINER	3160.7	1121.1	336.5	444.2	202.9	506.4
063-0007	JTL GROUP INC - TARGET RANGE	0.0	0.0	10.1	24.9	0.0	0.0
063-0009	JENSEN PAVING	0.9	0.6	0.4	0.2	0.5	0.4
063-0012	FLYNN LANE	8.9	4.3	66.9	216.7	95.8	4.0
063-0013	JTL GROUP INC - MICHAEL ROAD	3.5	3.3	16.6	48.3	6.8	2.6
063-0014	MISSOULA READY MIX	0.0	0.0	2.9	6.4	0.0	0.0
063-0015	BFI WASTE SYSTEMS OF NA INC	3.1	4.3	1.3	1.3	2.3	1.6
063-0016	BRADY NELSON	0.0	0.0	2.8	7.3	0.0	0.0
063-0018	MONTANA RAIL LINK	0.0	0.0	0.0	0.0	0.0	0.0
063-0021	BORDEN CHEMICAL INC	0.5	2.5	0.8	0.8	0.0	6.7
063-0022	MISSOULA BULK TERMINAL	24.5	9.8	0.0	0.0	0.0	72.6
063-0023	JOHNSON BROS. CONTRACTING INC.	0.0	0.0	0.4	0.7	0.0	0.0
063-0024	TWITE FAMILY PARTNERSHIP	0.0	0.0	0.1	0.1	0.0	0.0
063-0025	RICHARDS DEVELOPMENT SITE	0.0	0.0	0.5	0.7	0.0	0.0
TOTAL		3315.9	1665.4	735.3	1119.7	316.6	780.9

Musselshell County

SOURCE NUMBER	SOURCE NAME	CO	NO2	PM10	TOTAL PARTICULATE	SO2	VOC
065-0003	BULL MOUNTAIN MINE	0.1	0.3	2.7	5.7	0.0	0.0

Park County

SOURCE NUMBER	SOURCE NAME	CO	NO2	PM10	TOTAL PARTICULATE	SO2	VOC
067-0001	RY TIMBER	1.0	4.7	22.7	42.2	0.3	0.2
067-0002	PARK COUNTY REFUSE DISTRICT	1.9	20.6	9.1	12.7	11.1	9.8
067-0008	LIVINGSTON STATION 1&2	0.2	0.1	0.0	0.0	0.0	0.2
067-0010	FRANZEN-DAVIS FUNERAL HOME INC	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL		3.2	25.4	31.8	54.9	11.4	10.2

Phillips County

SOURCE NUMBER	SOURCE NAME	CO	NO2	PM10	TOTAL PARTICULATE	SO2	VOC
071-0003	BOWDOIN COMPRESSOR STATION	32.7	49.2	1.1	1.1	0.1	14.7
071-0004	HI-LINE CREMATORY	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL		32.7	49.2	1.1	1.1	0.1	14.7

Pondera County

SOURCE NUMBER	SOURCE NAME	CO	NO2	PM10	TOTAL PARTICULATE	SO2	VOC
073-0003	MONTALBAN OIL & GAS OPERATIONS INC	1.0	6.7	0.1	0.1	0.0	1.4
073-0004	BALKO INC - LEDGER FIELD COMPRESSOR ST	5.5	42.1	0.1	0.1	0.0	2.4
TOTAL		6.5	48.8	0.2	0.2	0.0	3.8

Powell County

SOURCE NUMBER	SOURCE NAME	CO	NO2	PM10	TOTAL PARTICULATE	SO2	VOC
077-0002	LOUISIANA-PACIFIC - DEER LODGE	73.1	53.3	62.8	110.7	4.5	66.7

Ravalli County

SOURCE NUMBER	SOURCE NAME	CO	NO2	PM10	TOTAL PARTICULATE	SO2	VOC
081-0005	ROCKY MOUNTAIN LABORATORIES	4.8	5.7	0.4	0.5	0.2	0.7
081-0006	BITTERROOT PET CREMATORIUM	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL		4.8	5.8	0.4	0.5	0.2	0.7

Richland County

SOURCE NUMBER	SOURCE NAME	CO	NO2	PM10	TOTAL PARTICULATE	SO2	VOC
083-0003	MDU - LEWIS & CLARK STATION	85.1	778.8	76.5	160.3	780.0	5.7
083-0005	WCCO-KRC ACQUISITION CORPORATION	12.0	21.7	39.7	131.0	2.3	1.5
083-0008	N YELLOWSTONE	0.4	1.2	0.2	0.2	0.0	2.2
083-0014	RICHLAND STATION	0.6	1.5	0.1	0.1	0.0	0.8
083-0015	RICHLAND STATION - 083-0015	0.0	0.0	1.3	5.3	0.0	4.6
TOTAL		98.0	803.1	117.7	296.9	782.3	14.7

Roosevelt County

SOURCE NUMBER	SOURCE NAME	CO	NO2	PM10	TOTAL PARTICULATE	SO2	VOC
085-0005	MONTOLA GROWERS INC	2.0	11.8	15.3	46.2	0.0	213.4
085-0006	N. BORDER PIPELINE CO STA. 3	97.3	107.8	6.5	6.5	5.2	13.0
TOTAL		99.3	119.6	21.8	52.8	5.2	226.4

Rosebud County

SOURCE NUMBER	SOURCE NAME	CO	NO2	PM10	TOTAL PARTICULATE	SO2	VOC
087-0007	COLSTRIP ENERGY LTD PARTNERSHIP	1.0	537.5	20.0	31.1	705.6	3.8
087-0008	COLSTRIP STEAM ELECTRIC STATION	2177.2	31901.4	503.7	3093.9	15823.9	304.0
087-0009	BIG SKY MINE	189.2	170.4	220.4	805.4	18.6	12.6
087-0010	TONGUE RIVER LUMBER CO	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL		2367.3	32609.3	744.0	3930.4	16548.1	320.4

Sanders County

SOURCE NUMBER	SOURCE NAME	CO	NO2	PM10	TOTAL PARTICULATE	SO2	VOC
089-0006	US ANTIMONY MINE & MILL	0.5	2.5	8.9	8.9	1.7	0.0
089-0007	THOMPSON FALLS BULK TERMINAL	0.0	0.0	0.0	0.0	0.0	23.4
089-0009	THOMPSON RIVER CO-GEN LLC	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL		0.5	2.5	8.9	8.9	1.7	23.4

Sheridan County

SOURCE NUMBER	SOURCE NAME	CO	NO2	PM10	TOTAL PARTICULATE	SO2	VOC
091-0001	CLEAR LAKE STATION	1.1	0.8	0.2	0.2	0.0	1.7
091-0003	RESERVE STATION - 091-0003	0.0	0.0	0.2	0.4	0.0	11.7
TOTAL		1.1	0.8	0.4	0.6	0.0	13.4

Butte-Silverbow County

SOURCE NUMBER	SOURCE NAME	CO	NO2	PM10	TOTAL PARTICULATE	SO2	VOC
093-0007	BUTTE-SILVER BOW ASPHALT PLANT	0.4	0.8	12.4	25.4	1.4	1.1
093-0009	BERKELY & CONTINENTAL PIT	18.1	38.0	16.4	35.6	4.1	2.7
093-0012	BLANKENSHIP - 093-0012	2.2	0.1	1.5	2.1	0.7	0.6
093-0013	MSE TECHNOLOGY APPLICATION	0.0	0.0	0.0	0.0	0.0	0.0
093-0015	ADVANCED SILICON MATERIALS FACILITY	5.5	22.1	19.2	19.2	0.1	0.4
093-0016	BUTTE CREMATORIES INC	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL		26.3	61.1	49.5	82.4	6.3	4.9

Stillwater County

SOURCE NUMBER	SOURCE NAME	CO	NO2	PM10	TOTAL PARTICULATE	SO2	VOC
095-0002	STILLWATER MINING CO SMELTER	7.1	8.4	29.2	30.1	1.0	0.4
095-0003	ABSAROKEE #054-1	0.0	0.1	0.0	0.0	0.0	0.0
095-0004	BLACKSTONE OPERATING	1.0	0.9	0.1	0.1	0.0	1.5
TOTAL		8.1	9.4	29.3	30.2	1.0	1.9

Sweet Grass County

SOURCE NUMBER	SOURCE NAME	CO	NO2	PM10	TOTAL PARTICULATE	SO2	VOC
097-0001	EAST BOULDER MINE PROJECT	56.8	66.2	17.2	35.5	6.8	3.9
097-0003	LODESTAR MINING AND EXPLORATION	0.1	0.3	0.1	0.2	0.0	0.0
TOTAL		56.9	66.5	17.3	35.8	6.8	3.9

Teton County

SOURCE NUMBER	SOURCE NAME	CO	NO2	PM10	TOTAL PARTICULATE	SO2	VOC
099-0002	FAIRFIELD ELEVATOR	0.0	0.0	14.0	42.5	0.0	0.0
099-0004	MOUNTAIN VIEW OF MONTANA LLC	0.0	0.0	4.5	15.5	0.0	0.0
TOTAL		0.0	0.0	18.5	58.0	0.0	0.0

Toole County

SOURCE NUMBER	SOURCE NAME	CO	NO2	PM10	TOTAL PARTICULATE	SO2	VOC
101-0003	NORTHERN EXPRESS TRANSPORTATION AUTH	0.0	0.0	0.1	0.1	0.0	0.0
101-0004	SHELBY KEVIN FIELD STATION 042	11.6	10.4	0.1	0.1	0.0	0.1
101-0008	TELSTAD FIELD STATATION 033	22.8	128.4	0.7	0.7	0.0	4.5
101-0009	SOUTH MOULTON FIELD	0.0	0.0	0.0	0.0	0.0	0.0
101-0010	NORTH MOULTON FIELD	7.2	74.8	0.2	0.2	0.0	21.5
101-0014	SPECTRUM ENERGY - NORTH DUNKIRK	16.4	12.6	0.2	0.2	0.0	12.7
101-0015	FERDIG OIL CO	2.4	17.1	0.1	0.1	0.0	0.8
101-0016	GRIFFON PETROLEUM INC	14.5	21.7	0.4	0.4	0.0	3.1
101-0017	CASCADE COUNTY GAS PLANT	5.4	6.6	0.1	0.1	0.0	4.5
101-0018	ALOE JOINT VENTURES	4.7	44.4	0.2	0.2	0.0	1.9
101-0021	FULTON FUEL COMPANY - COMPRESSION	0.0	0.0	0.0	0.0	0.0	0.0
101-0022	FULTON FUEL COMPANY - MINERS COULEE	12.0	10.3	0.2	0.2	0.0	1.3
TOTAL		97.1	326.2	2.2	2.3	0.1	50.4

Valley County

SOURCE NUMBER	SOURCE NAME	CO	NO2	PM10	TOTAL PARTICULATE	SO2	VOC
105-0002	WILLISTON BASIN - SACO	189.2	226.9	1.3	1.3	0.1	98.9
105-0003	NORTHERN BORDER PIPELINE CO STA 1	97.0	51.6	5.5	5.5	4.3	13.0
TOTAL		286.3	278.5	6.8	6.8	4.4	111.8

Wibaux County

SOURCE NUMBER	SOURCE NAME	CO	NO2	PM10	TOTAL PARTICULATE	SO2	VOC
109-0002	ENCORE OPERATING LP	20.7	27.6	0.4	0.4	0.0	4.4
109-0003	PINE GAS GATHERING	1.7	4.6	0.2	0.2	0.0	1.4
TOTAL		22.5	32.2	0.6	0.6	0.0	5.8

Yellowstone County

SOURCE NUMBER	SOURCE NAME	CO	NO2	PM10	TOTAL PARTICULATE	SO2	VOC
111-0007	WESTERN SUGAR COOPERATIVE	179.0	201.4	40.6	84.6	77.2	14.6
111-0011	CONOCOPHILLIPS	608.8	616.5	163.1	164.1	730.8	479.0
111-0012	CENEX HARVEST STATES	382.3	996.9	109.5	109.5	2075.2	1482.6
111-0013	EXXONMOBIL BILLINGS REFINERY	396.1	974.6	189.0	441.3	5358.9	1168.1
111-0014	MONTANA SULPHUR & CHEMICAL	721.1	5.8	0.7	0.4	2403.3	0.4
111-0015	PPL MONTANA - JE CORETTE PLANT	217.3	1692.7	61.2	562.5	3005.1	25.3
111-0019	COORS BREWING CO	0.0	0.0	1.2	3.8	0.0	0.0
111-0023	YELLOWSTONE ENERGY LIMITED PARTNERSHIP	80.8	379.3	15.3	45.5	1549.4	10.6
111-0024	EXXON MOBIL BULK TERMINAL	0.0	0.0	0.0	0.0	0.0	3.4
111-0025	LAUREL EAST VETERINARY SERVICE	0.1	0.1	0.1	0.0	0.1	0.1
111-0028	BILLINGS BAKERY	1.6	2.2	0.0	0.2	0.0	52.9
111-0032	BILLINGS - 111-0032	0.1	0.1	0.1	0.1	0.0	0.0
TOTAL		2587.3	4869.4	580.8	1412.2	15199.9	3237.0

Portable Source

SOURCE NUMBER	SOURCE NAME	CO	NO2	PM10	TOTAL PARTICULATE	SO2	VOC
777-0310	FLATHEAD COUNTY ROAD DEPT.	2.2	3.1	7.7	10.7	6.5	5.2
777-2382	DEER LODGE ASPHALT INC	0.1	0.3	0.3	0.6	0.2	0.2
777-2523	GALLATIN COUNTY RD DEPT	0.3	1.5	3.4	5.6	0.1	0.1
777-2526	CENTURY - 777-2526	0.0	0.0	0.0	0.0	0.0	0.0
777-2527	CENTURY - 777-2527	0.2	0.6	0.6	0.9	0.3	0.4
777-2528	KONITZ - 777-2528	0.6	2.1	5.8	10.6	0.3	0.1
777-2529	KONITZ - 777-2529	0.7	2.8	6.3	8.8	0.4	0.1
777-2533	TREASURE STATE CONSTRUCTION	1.0	3.8	1.3	1.7	0.6	0.1
777-2535	JTL GROUP KALISPELL - 777-2535	9.7	40.3	39.0	58.6	4.9	2.1

777-2537	MONTGOMERY CONSTRUCTION	0.4	1.8	2.2	7.6	0.1	0.1
777-2542	GILMAN EXCAVATING - 777-2542	2.6	6.8	11.8	15.0	0.9	2.1
777-2543	GILMAN EXCAVATING INC	3.7	9.4	17.5	25.3	15.4	14.7
777-2544	GILMAN EXCAVATING - 777-2544	0.0	0.0	0.0	0.0	0.0	0.0
777-2545	GILMAN EXCAVATING - 777-2545	4.9	18.9	10.6	15.7	3.1	0.6
777-2551	WEAVER GRAVEL INC	1.0	4.5	0.6	0.8	0.3	0.4
777-2552	JOHNSON BROTHERS CONTRACTING	0.0	0.0	0.0	0.0	0.0	0.0
777-2555	STS GRAVEL	0.0	0.0	3.3	5.9	0.0	0.0
777-2559	FIKE CRUSHING	0.4	1.5	2.3	4.5	0.2	0.0
777-2561	RIVERSIDE CONTRACTING - 777-2561	1.1	2.7	6.1	9.2	4.2	4.9
777-2566	JTL HIGHWAY - 777-2566	9.9	38.1	63.9	130.2	6.1	1.3
777-2569	PRINCE INC	9.7	8.2	31.6	40.3	30.9	45.0
777-2570	FIGGINS SAND & GRAVEL - 777-2570	0.0	0.0	19.7	45.9	0.0	0.0
777-2572	WOODRING'S CONSTRUCTION	0.1	0.6	0.3	0.4	0.0	0.0
777-2576	PRINCE INC - 777-2576	4.0	17.2	17.7	23.6	1.7	1.1
777-2581	FISHER SAND & GRAVEL - 777-2581	0.0	0.0	0.0	0.0	0.0	0.0
777-2584	FISHER SAND & GRAVEL - 777-2584	0.0	0.0	0.0	0.0	0.0	0.0
777-2585	FISHER SAND & GRAVEL - 777-2585	0.0	0.0	0.0	0.0	0.0	0.0
777-2587	FISHER SAND & GRAVEL - 777-2587	0.0	0.0	0.0	0.0	0.0	0.0
777-2590	HK CONTRACTORS INC - 2590	0.6	3.1	5.7	5.2	1.1	1.1
777-2596	HL OSTERMILLER CONSTRUCTION INC	0.9	3.0	3.8	5.1	3.1	2.8
777-2598	CENTENNIAL - 777-2598	0.4	1.8	4.3	6.8	0.1	0.1
777-2599	MICKELSON ROCK PRODUCTS	0.1	0.3	0.4	0.8	0.0	0.0
777-2601	JAMES G CARNEY	0.2	0.9	0.7	1.2	0.1	0.1
777-2605	SHUMAKER TRUCKING & EXCAVATING	0.3	1.5	1.1	1.4	0.1	0.1
777-2615	LHC INC - 777-2615	1.0	3.8	3.8	7.8	0.6	0.1
777-2618	BORDER STATES - 777-2618	0.0	0.0	0.0	0.0	0.0	0.0
777-2621	MAYO CONSTRUCTION CO	0.0	0.0	0.0	0.0	0.0	0.0
777-2622	SCHELLINGER CONSTRUCTION - 2622	0.0	0.0	0.2	0.3	0.0	0.0
777-2623	SCHELLINGER CONSTRUCTION - 2623	5.8	22.1	23.8	41.9	3.6	0.7
777-2624	SCHELLINGER CONSTRUCTION - 2624	3.9	14.9	9.3	17.8	1.4	0.5
777-2626	PIONEER CONCRETE & FUEL - 777-2626	0.5	1.9	1.1	1.5	0.3	0.1
777-2628	BIG SKY ASPHALT - 2628	0.0	0.0	0.0	0.0	0.0	0.0
777-2641	CENTURY - 777-2641	1.5	2.6	4.8	5.6	3.0	3.1
777-2652	PURCELL CONSTRUCTION	0.3	1.1	8.0	16.7	0.2	0.0
777-2658	RIVERSIDE CONTRACTING - 777-2658	3.1	7.4	16.8	25.4	9.3	23.1
777-2659	JTL GROUP - 777-2659	0.0	0.0	0.7	1.4	0.0	0.0
777-2673	HELENA SAND & GRAVEL - 777-2673	8.8	40.8	27.2	48.1	2.7	3.3
777-2675	WASHINGTON GROUP - 2675	0.1	0.2	11.4	38.0	0.0	0.0
777-2678	KEM READY MIX INC	0.0	0.0	0.3	0.5	0.0	0.0

777-2684	FISHER SAND & GRAVEL - 777-2684	0.0	0.0	0.0	0.0	0.0	0.0
777-2689	MCELROY & WILKEN INC - 777-2689	1.2	4.5	7.7	16.7	0.7	0.1
777-2690	HL OSTERMILLER CONSTRUCTION	0.8	3.6	5.2	12.2	0.2	0.3
777-2691	AM WELLES INC - 777-2691	1.6	6.2	8.9	13.6	1.0	0.2
777-2696	CASINO CREEK CONCRETE INC	0.1	0.6	2.4	4.4	0.0	0.0
777-2712	HAMILTON ROCK PRODUCTS	0.0	0.0	1.3	2.7	0.0	0.0
777-2715	PORTABLE INC - 2715	0.7	3.3	6.0	11.0	0.2	0.3
777-2716	FLATHEAD COUNTY ROAD DEPARTMENT	0.3	1.2	1.3	2.3	0.1	0.1
777-2730	FISHER SAND & GRAVEL - 777-2730	0.0	0.0	8.6	19.1	0.0	0.0
777-2733	LIVINGSTON SAND & GRAVEL	0.0	0.0	2.0	3.7	0.0	0.0
777-2735	BLAHNIK - 777-2735	2.4	3.4	11.0	18.0	6.6	5.2
777-2744	HOLLOW CONTRACTING, INC. 2744	0.4	1.5	1.0	2.5	0.2	0.0
777-2746	T-BEND - 777-2746	0.3	0.6	4.8	5.9	3.7	4.0
777-2751	WASHINGTON GROUP - 2751	3.3	13.0	22.6	43.9	2.0	0.5
777-2774	CENTENNIAL - 777-2774	0.0	0.0	0.0	0.0	0.0	0.0
777-2775	RIVERSIDE CONTRACTING INC	3.9	9.2	21.8	29.3	18.7	18.5
777-2776	GOOSE BAY EQUIPMENT, INC - 777-2776	0.0	0.0	2.0	3.8	0.0	0.0
777-2777	A-1 PAVING - 777-2777	0.0	0.0	1.8	2.9	0.0	0.0
777-2788	JTL GROUP INC - 777-2788	0.0	0.0	30.3	89.6	0.0	0.0
777-2789	BLANKENSHIP - 777-2789	0.0	0.0	0.1	0.2	0.0	0.0
777-2800	STENBERG CONSTRUCTION	0.0	0.0	0.0	0.0	0.0	0.0
777-2820	INTERMOUNTAIN CONSTRUCTION & MATERIALS	0.0	0.0	0.0	0.0	0.0	0.0
777-2828	JTL GROUP INC - 777-2828	0.0	0.0	0.0	0.0	0.0	0.0
777-2839	CENTURY CONSTRUCTION CO	0.9	2.6	5.9	10.4	2.0	2.4
777-2844	VOLK SAND & GRAVEL INC	0.1	0.3	0.2	0.3	0.0	0.0
777-2848	FISHER SAND & GRAVEL - 777-2848	0.9	3.4	20.3	34.3	0.6	0.1
777-2852	J&J EXCAVATING AND TRUCKING	0.0	0.0	0.0	0.0	0.0	0.0
777-2859	RISSLER-MCMURRY CO - 777-2859	0.0	0.0	0.0	0.0	0.0	0.0
777-2861	RISSLER-MCMURRY CO - 777-2861	0.0	0.0	0.0	0.0	0.0	0.0
777-2864	COLEMAN CONSTRUCTION INC	2.4	11.2	1.8	2.6	0.7	0.9
777-2865	RISSLER-MCMURRY CO - 777-2865	0.0	0.0	0.0	0.0	0.0	0.0
777-2866	RISSLER-MCMURRY CO - 777-2866	0.0	0.0	0.0	0.0	0.0	0.0
777-2867	RISSLER-MCMURRY - 777-2867	0.0	0.0	0.0	0.0	0.0	0.0
777-2868	RISSLER-MCMURRY CO - 777-2868	0.0	0.0	0.0	0.0	0.0	0.0
777-2870	JENSEN PAVING - 777-2870	0.9	3.4	3.9	6.1	0.6	0.1
777-2872	JENSEN PAVING - 777-2872	4.7	11.9	22.1	28.5	19.7	15.1
777-2873	HOLLOW CONTRACTING, INC. 2873	0.7	1.7	2.4	3.1	2.5	2.7
777-2876	ABC GRAVEL - 777-2876	0.4	1.8	0.7	1.3	0.1	0.1
777-2892	TREASURE STATE CONSTRUCTION - 777-2892	1.0	3.8	4.5	9.8	0.6	0.1
777-2893	TREASURE STATE CONSTRUCTION - 777-2893	1.0	3.8	1.5	2.1	0.6	0.1

777-2895	BLAHNIK - 777-2895	0.7	2.9	4.3	3.8	0.4	0.1
777-2897	JTL GROUP HIGHWAY - 777-2897	0.0	0.0	0.0	0.0	0.0	0.0
777-2901	FIRST ENERGY SERVICES COMPANY	0.0	0.0	0.0	0.0	0.0	0.0
777-2902	BALTRUSCH - 777-2902	0.8	3.2	2.2	4.9	0.5	0.1
777-2904	FISHER SAND & GRAVEL - 777-2904	0.8	3.6	8.7	14.4	0.2	0.3
777-2910	FISHER SAND & GRAVEL - 777-2910	0.0	0.0	0.0	0.0	0.0	0.0
777-2916	FISHER SAND & GRAVEL - 777-2916	0.0	0.0	0.0	0.0	0.0	0.0
777-2917	FISHER SAND & GRAVEL - 777-2917	0.0	0.0	0.0	0.0	0.0	0.0
777-2921	AM WELLES INC - 777-2921	1.4	5.5	11.4	15.6	0.9	0.2
777-2925	LHC INC - 777-2925	1.0	3.8	2.1	4.4	0.6	0.1
777-2927	UNITED MATERIALS (MRGP)	0.0	0.1	0.4	0.7	0.1	0.1
777-2928	UNITED MATERIALS OF GREAT FALLS - 777-2928	0.0	0.0	6.6	13.1	0.0	0.0
777-2939	TITAN CONSTRUCTION - 2939	0.1	0.3	0.4	0.7	0.0	0.0
777-2941	UNITED MATERIALS OF GREAT FALLS 777-2941	2.1	7.9	13.0	23.1	1.3	0.3
777-2944	FELSTET CONCRETE PRODUCTS - 2944	0.0	0.0	0.5	1.0	0.0	0.0
777-2960	BATES - 2960	0.6	2.7	4.9	9.0	0.2	0.2
777-2961	DICKMAN EXCAVATING	0.1	0.3	0.1	0.1	0.0	0.0
777-2971	HALL SAND AND GRAVEL	0.0	0.0	0.1	0.3	0.0	0.0
777-2977	HK CONTRACTORS INC - 2977	0.0	0.0	0.0	0.0	0.0	0.0
777-2978	JTL GROUP MISSOULA - 777-2978	2.0	7.5	14.6	21.0	1.2	0.3
777-2984	JIM CLARK & SONS CONTRACTING	0.0	0.0	0.0	0.0	0.0	0.0
777-2985	LHC INC - 777-2985	1.3	1.9	4.2	1.8	6.4	3.0
777-2986	WEST END SAND & GRAVEL CO	0.6	2.7	2.8	5.2	0.2	0.2
777-2989	HK CONTRACTORS INC - 2989	0.5	1.9	0.1	0.2	0.7	0.4
777-2996	JTL GROUP KALISPELL - 777-2996	4.6	5.1	15.4	19.0	13.9	19.9
777-3002	JTL GROUP HIGHWAY - 777-3002	3.0	11.4	13.6	19.0	19.4	19.8
777-3004	SHENANDOAH ROCK PRODUCTS	0.1	0.3	0.1	0.2	0.0	0.0
777-3005	LS JENSEN & SONS INC	0.0	0.0	0.5	1.0	0.0	0.0
777-3008	NORTHERN LINE LAYERS - 777-3008	2.7	8.9	5.6	6.3	8.6	8.4
777-3009	ARG SAND & GRAVEL	0.0	0.0	0.0	0.0	0.0	0.0
777-3010	THOMPSON FALLS SAND & GRAVEL	0.2	0.9	3.4	6.9	0.1	0.1
777-3011	RAVALLI COUNTY ROAD DEPARTMENT	0.4	1.5	2.5	3.1	0.2	0.0
777-3013	RAVALLI COUNTY ROAD DEPARTMENT - 777-3013	0.3	0.4	9.3	19.0	1.5	1.7
777-3014	POLSON READY MIX CONCRETE INC - 777-3014	1.0	3.8	8.3	5.4	0.6	0.1
777-3015	JOHN SCHLECHT - 3015	0.1	0.4	0.1	0.2	0.3	0.1
777-3016	DONALDSON - 777-3016	0.0	0.0	4.7	9.4	0.0	0.0
777-3017	DONALDSON - 777-3017	0.0	0.0	0.2	0.5	0.0	0.0
777-3018	BAY MATERIAL - 777-3018	0.4	1.8	0.3	0.5	0.1	0.1
777-3020	GRANITE CONCRETE CO INC - 777-3020	0.0	0.0	2.1	4.5	0.0	0.0
777-3022	TROY SAND & GRAVEL	0.0	0.0	0.0	0.0	0.0	0.0

777-3023	POLSON READY MIX CONCRETE INC - 777-3023	0.0	0.0	0.2	0.3	0.0	0.0
777-3024	WOODS CRUSHING & HAULING INC	0.1	0.4	0.5	2.2	0.1	0.0
777-3026	LASALLE SAND & GRAVEL LLP	0.2	0.9	1.6	1.3	0.1	0.1
777-3028	SPERRY GRAVEL (DBA DISCOUNT GRAVEL)	0.1	0.3	0.4	0.7	0.0	0.0
777-3029	REMP SAND & GRAVEL LLC	0.6	2.7	1.6	2.3	0.2	0.2
777-3040	RE MILLER & SONS	0.1	0.6	0.9	1.7	0.0	0.0
777-3042	CENTURY CONSTRUCTION CO - 777-3042	5.6	6.8	17.6	26.4	10.6	12.7
777-3045	SCHELLINGER CONSTRUCTION - 3045	7.9	9.1	19.5	26.3	18.5	18.3
777-3046	RIVERSIDE CONTRACTING INC - 777-3046	1.0	0.8	5.3	2.4	4.9	5.7
777-3047	LHC INC - 777-3047	0.0	0.0	0.0	0.0	0.0	0.0
777-3048	LHC INC - 777-3048	0.0	0.0	0.0	0.0	0.0	0.0
777-3049	LHC INC - 777-3049	0.0	0.0	0.5	1.2	0.0	0.0
777-3050	LHC INC - 777-3050	0.0	0.0	0.4	0.9	0.0	0.0
777-3051	CHEMICAL LIME CO	0.0	0.0	0.0	0.0	0.0	0.0
777-3052	CHEMICAL LIME CO - 777-3052	0.0	0.0	0.0	0.0	0.0	0.0
777-3054	BITTERROOT ROCK PRODUCTS	0.1	0.6	0.8	1.4	0.0	0.0
777-3057	KEENEY CONSTRUCTION CO	0.0	0.0	0.0	0.0	0.0	0.0
777-3061	BALTRUSCH - 777-3061	0.2	0.1	0.5	0.6	0.6	0.7
777-3062	FISHER SAND & GRAVEL - 777-3062	0.4	1.7	6.9	13.1	0.3	0.1
777-3064	EH OFTEDAL & SONS	0.0	0.0	0.0	0.0	0.0	0.0
777-3065	JTL GROUP - 777-3065	0.0	0.0	2.6	5.6	0.0	0.0
777-3066	RMR AGGREGATE	0.4	0.3	0.8	0.8	0.0	0.0
777-3067	FISHER SAND & GRAVEL - 777-3067	0.1	0.2	0.5	1.3	0.0	0.0
777-3068	SPAULDING - 777-3068	0.0	0.0	0.0	0.0	0.0	0.0
777-3073	WARREN TRANSPORT	0.0	0.0	0.0	0.0	0.0	0.0
777-3075	FISHER SAND & GRAVEL - 777-3075	0.8	3.2	9.0	17.2	0.5	0.1
777-3076	FISHER SAND & GRAVEL - 777-3076	0.6	2.7	3.7	8.3	0.2	0.2
777-3077	FISHER SAND & GRAVEL - 777-3077	0.1	0.4	0.3	0.6	0.1	0.0
777-3078	FISHER SAND & GRAVEL - 777-3078	0.0	0.0	0.0	0.0	0.0	0.0
777-3079	FISHER SAND & GRAVEL - 777-3079	0.0	0.0	0.0	0.0	0.0	0.0
777-3080	FISHER SAND & GRAVEL - 777-3080	0.1	0.4	2.0	3.9	0.1	0.0
777-3081	FISHER SAND & GRAVEL - 777-3081	0.6	2.1	6.6	16.2	0.3	0.1
777-3084	GRATECH COMPANY - 3084	0.0	0.0	0.0	0.0	0.0	0.0
777-3087	PHILLIPS CONSTRUCTION	0.0	0.0	0.2	0.4	0.0	0.0
777-3090	HK CONTRACTORS INC - 3090	0.0	0.0	0.0	0.0	0.0	0.0
777-3091	HK CONTRACTORS INC - 3091	0.0	0.0	0.0	0.0	0.0	0.0
777-3095	SCHESSLER READY MIX	0.0	0.0	7.5	16.1	0.0	0.0
777-3096	JTL GROUP INC - 777-3096	34.4	2.5	22.2	28.3	19.7	29.1
777-3097	KRUG & SONS INC	0.0	0.0	2.0	4.1	0.0	0.0
777-3098	KOONTZ CONSTRUCTION INC	0.0	0.0	0.4	0.8	0.0	0.0

777-3099	KOOTENAI PAVING LLC	3.0	8.6	3.9	4.8	2.0	3.3
777-3100	JTL GROUP INC - BILLINGS - 777-3100	0.0	0.0	4.3	7.3	0.0	0.0
777-3101	JTL GROUP INC - BILLINGS - 777-3101	0.0	0.0	30.6	61.0	0.0	0.0
777-3103	FISHER SAND & GRAVEL - 777-3103	0.4	1.7	1.9	4.1	0.3	0.1
777-3104	RL SCHAFF CONCRETE	0.0	0.0	3.0	5.6	0.0	0.0
777-3108	ROCKY MOUNTAIN RECYCLING & CRUSHING	0.1	0.3	0.2	0.3	0.0	0.0
777-3109	BROKEN O RANCH	0.0	0.0	0.1	0.3	0.0	0.0
777-3110	THOMPSON EXCAVATING - 3110	0.0	0.0	1.5	3.2	0.0	0.0
777-3111	GASVODA CONSTRUCTION	0.0	0.0	0.0	0.0	0.0	0.0
777-3112	WIBAUX COUNTY ROAD DEPARTMENT	0.2	0.9	0.4	0.7	0.1	0.1
777-3115	VALLEY EXCAVATING/WEST SHORE GRAVEL	0.0	0.0	0.1	0.2	0.0	0.0
777-3127	THIESSEN TEAM U.S.A.	0.0	0.0	0.2	0.3	0.0	0.0
777-3129	M&W MILLING & REFINING, INC.	0.0	0.0	0.0	0.0	0.0	0.0
777-3132	PORTABLE INC - 3132	0.0	0.0	2.5	5.1	0.0	0.0
777-3133	EMPIRE SAND & GRAVEL - 777-3133	8.6	1.5	6.3	5.0	3.1	3.7
777-3134	EMPIRE SAND & GRAVEL - 777-3134	0.0	0.0	7.5	15.1	0.0	0.0
777-3143	SLOPE COMPANY	0.1	0.3	0.0	0.0	0.0	0.0
777-3146	VOLK SAND & GRAVEL - 3146	0.3	1.3	0.7	0.8	1.0	0.7
777-3149	ROCKY MOUNTAIN CONCRETE PRODUCTS	0.0	0.2	10.9	13.9	0.0	0.2
777-3151	BRIDGEFORD CONSTRUCTION	0.0	0.0	0.6	1.5	0.0	0.0
777-3155	RAIL ENERGY OF MONTANA - BUTTE	0.0	0.0	0.0	0.0	0.0	0.0
777-3159	RBC ENTERPRISES - 3159	0.1	0.3	1.2	2.5	0.0	0.0
777-3161	VALLEY EXCAVATING - 777-3161	0.4	1.8	4.0	7.8	0.1	0.1
777-3162	UNITED MATERIALS OF GREAT FALS - 777-3162	1.6	6.4	12.7	41.7	9.8	5.8
777-3163	C&S CONSTRUCTION	0.1	0.3	0.9	1.8	0.0	0.0
777-3167	HELENA SAND & GRAVEL - 777-3167	0.6	2.1	3.8	8.0	0.3	0.1
777-3172	FISHER SAND & GRAVEL - 777-3172	0.6	2.7	2.8	5.4	0.1	0.2
777-3173	FISHER SAND & GRAVEL - 777-3173	0.0	0.0	0.0	0.0	0.0	0.0
777-3174	FISHER SAND & GRAVEL - 777-3174	0.0	0.0	0.0	0.0	0.0	0.0
777-3177	ARLIAN EXCAVATING	0.0	0.0	0.0	0.1	0.0	0.0
777-3180	CHERRY CREEK DEVELOPMENT	0.0	0.0	0.0	0.0	0.0	0.0
777-3186	KONITZ -777-3186	0.0	0.0	0.0	0.0	0.0	0.0
777-3187	KONITZ - 777-3187	0.0	0.0	0.0	0.0	0.0	0.0
777-3188	T-BEND - 777-3188	0.4	1.8	0.8	1.5	0.1	0.1
777-3191	VALLEY EXCAVATING - 777-3191	0.1	0.3	1.3	2.7	0.0	0.0
777-3192	VALLEY EXCAVATING - 777-3192	0.0	0.0	0.0	0.0	0.0	0.0
777-3193	NORTHERN LINE LAYERS - 777-3193	1.1	4.3	2.4	5.0	0.7	0.1
777-3196	VALLEY EXCAVATING - 777-3196	0.4	1.8	0.1	0.1	0.1	0.1
777-3204	HOLLOW CONTRACTING, INC. 3204	0.2	0.6	0.5	1.1	0.1	0.0
777-3206	HILINE REDI-MIX - 777-3206	0.0	0.0	0.6	2.3	0.0	0.0

777-3207	INTERSTATE CONCRETE AND ASPHALT COMPANY	0.0	0.0	0.0	0.0	0.0	0.0
777-3213	GREAT NORTHERN BARK - 3213	0.0	0.0	0.0	0.0	0.0	0.0
777-3216	RBC ENTERPRISES - 3216	0.1	0.6	0.9	1.8	0.0	0.0
777-3223	BULLOCK CONTRACTING - 3223	0.0	0.0	0.0	0.0	0.0	0.0
777-3240	RIVERSIDE GRAVEL & TRUCKING	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL		204.2	513.9	940.8	1637.6	294.8	302.7

APPENDIX C -- HISTORICAL MONITORING SUMMARY

It was not possible to update this table for this year's Network Review. See the 2002 Network Review to review the data.